

NEWS SUMMARY

Business

Kaufman to visit U.S. for air talks

MR. GERALD KAUFMAN, Industry Minister, is to visit the U.S. within a fortnight to discuss collaborative arrangements on future aerospace programmes with Boeing, Lockheed and McDonnell Douglas as well as other manufacturers. **Back Page**

Westland Helicopters announced at the Farnborough International Air Show it is developing two unmanned radio-controlled helicopters for the Ministry of Defence. **Page 4**

BRITAIN'S trade surplus in standard and medium-sized electric motors fell sharply in the first half to £2.5m after a 1975 recovery in which an overall surplus of £10m was recorded. **Back Page and Page 8**

RESEARCH REPORT presents fresh evidence that ships registered under flags of convenience are a continuing threat to shipping safety and anti-pollution standards. **Page 32**

CUNARD Steam Ship Company to-day begins top level negotiations with bankers and court action in its £62.9m bid to acquire 13 U.K. registered cargo ships nominally owned by Maritime Fruit Carriers. **Page 4**

ASSOCIATED-Television Corporation's subsidiary, ITC, claims it will be the world's largest film maker and distributor within two years. **Page 8**

Improvement at Volkswagen

VOLKSWAGEN reported a strong improvement in first-half results and suggested it might pay off past heavy losses which caused a financial crisis 18 months ago. **Page 5**

GREEN CABINET will discuss expansion of trade with Mr. Edmund Dell, Trade Secretary, who started a three-day official visit yesterday. **Page 8**

CONGRESSIONAL sub-committee on energy and power has expressed serious doubts as to whether the trans-Alaskan pipeline can be completed on schedule by next summer.

IRISH REPUBLIC'S 800 commercial bank branches open for customers to-day for the first time in 10 weeks. The past week has been spent dealing with the backlog that accumulated during the nine-week pay strike by employees.

THE 800 shop stewards at British Leyland's Longbridge plant in Birmingham are meeting this morning to consider how to stop the wave of wildcat strikes which so far have made 22,000 idle and halted all Mini and Allegro production. **Back Page**

MEMBERSHIP of TUC-affiliated unions rose to a record level of more than 11m last year. A major factor was the rate of recruitment of women, which is significantly higher than for men. **Page 8**

NATIONAL HEALTH unions are to-day launching a renewed campaign aimed at putting pressure on the Government to tighten legislation being considered by Parliament to phase out private practice in the NHS. **Page 8**

EEC COMMISSION proposals to tax vegetable oils and fats will harm many sectors of the U.K. food industry, representatives of that industry will tell the Ministry of Agriculture this week. **Page 32**

NEW FIGURES this week are likely to indicate a slower rate of growth in bank lending. **Page 8**

Jones plan to link pay rises to living costs and efficiency

BY ROY ROGERS, LABOUR CORRESPONDENT IN BRIGHTON

A plan to link pay rises to the cost of living, yet leaving scope for additional increases based on improved efficiency and productivity, was unveiled yesterday by Mr. Jack Jones, general secretary of the Transport and General Workers' Union and main architect of the social contract between the TUC and the Government.

Mr. Jones gave details of some of his proposals for an "orderly" return to normal collective bargaining on the eve of the annual TUC congress here in Brighton. This will be seen as a further bid to dampen resistance to the present 4½ per cent. pay policy which may be generated when the Congress debates emotive issues such as high unemployment and the Government's proposed public expenditure cuts.

At the same time, increased pressure was being put on unions to withdraw all motions which are critical of the existing pay policy, which is now almost certain to survive the Congress intact. But the policy could still suffer an embarrassing setback at the hands of the country's 38,000 merchant navy seamen who are deciding whether to take industrial action aimed at securing pay rises which the TUC has declared are in breach of the policy.

A secret ballot, the results of which are due to be announced to-day, is expected to be a fairly close-run thing, possibly with a small majority in favour of industrial action.

The National Executive of the National Union of Seamen would then have to decide what sort of action could be justified by the ballot result. Sanctions such as banning week-end working or blocking ferry services appear to

be the most damaging action they could contemplate, a national strike having been virtually ruled out except in the unlikely event of an overwhelming demand in the ballot.

As part of its monitoring of the 4½ per cent. policy, the TUC has agreed with the Department of Employment that the seamen, claiming £5 a week backdated to July, are not entitled to any more money until January when they must abide by the £2.50 to £4 a week limit set out in the policy.

Seamen apart, the TUC leadership looks set for a successful week's Congress which, although promising widespread criticism of the Government for failing to take sufficient steps to curb rising unemployment, should leave the social contract sound.

The week also should see a tidying up of the TUC's somewhat ambiguous policy on industrial democracy and an expression of support for the Government's devolution proposals for Scotland and Wales.

In his blueprint for a return to free collective bargaining, Mr. Jones suggests early meetings between the TUC and the Confederation of British Industry to agree on a framework for voluntary pay limits based on

the movement in the cost of living. In addition, he wants provision for productivity and pay restructuring deals to help ease some of the pressures which have built up over the past few years of tight pay controls.

Explaining his proposals yesterday, Mr. Jones said the intention was to have regard to the movement in the cost of living — which he hoped would be down to single figures by the time the current policy expires next July — and reduce unit costs.

If we all acted responsibly — and he believed the trade union movement would — a return to normal collective bargaining could be achieved without disadvantages experienced in the past.

Emphasis would be on flexibility exercised responsibly, said Mr. Jones, stressing that the twin aims were to maintain a Labour government in office and effectively defeat inflation and unemployment. Further details of his strategy may emerge on Wednesday when he is due to attend a planned return to free collective bargaining beginning next year.

But it is the unemployment debate, also on Wednesday, which is expected to generate the most feeling among the 1,000 or so TUC delegates who represent more than 11m. workers.

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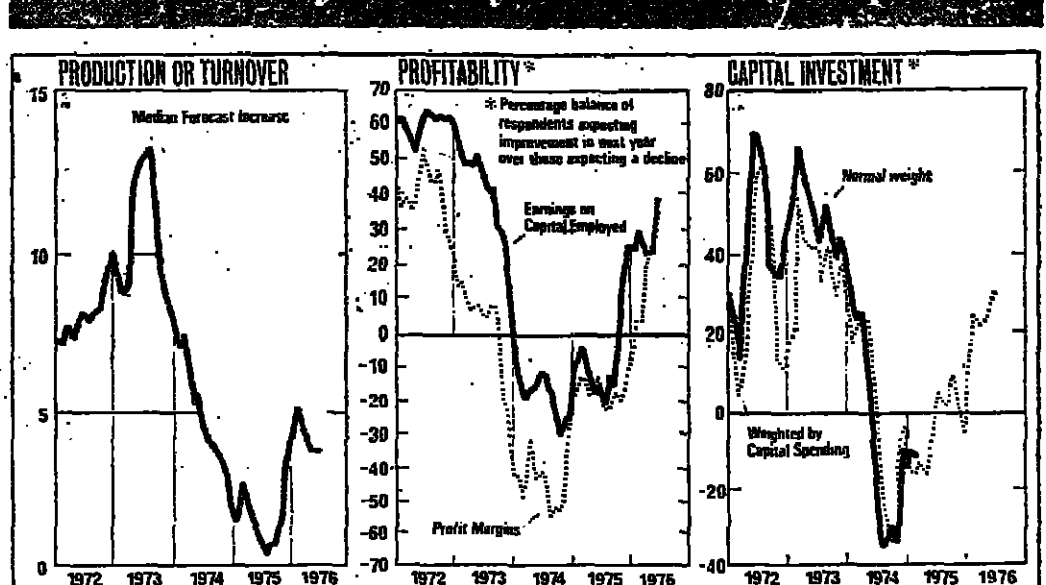
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FT Monthly Survey of Business Opinion



Setback for inflation hopes

THE GROWING doubt over the chances of the Government's inflation targets being achieved and over the prospect of an early reduction in the numbers of unemployed is given further support to-day by the results of the latest Financial Times monthly survey of business opinion.

Industry's expectations for wage costs have been revised sharply downward since the second stage of the pay policy came into operation. But the effect on total costs and on output prices is expected to be more than offset by the rise in raw material prices and the fall in sterling parities.

The median forecast increase for wage costs over the next 12 months has now fallen to 7.8 per cent., but the median forecast increases for total costs and prices remain at about 12-13 per cent.

On unemployment, the outlook has improved in the sense that the underlying trend of industry's forward manpower requirements is no longer deteriorating. But the number of companies expecting to take on more labour during the next 12 months remains just about in balance with those who expect to make do with less.

These matters apart, industry remains in a mood of quiet confidence. The recovery in activity is proceeding in a steady rather than a spectacular fashion. A further recovery in profitability is foreseen, and there are no obvious worries on the score of liquidity.

Almost half the latest all-industry sample — which consists of the companies interviewed during the past four months — expect to increase their capital spending in real terms during the next year. But, in general, there is no present intention to launch into a stock-building boom.

The survey, which was based on fresh interviews with companies in mechanical engineering, brewing and distilling, and paper, packaging, publishing and printing, also show that export prospects are generally considered to be as strong as ever.

EARNINGS ON CAPITAL

4 monthly moving total August 1976

	May-Aug.	Apr.-July	Mar.-June	Feb.-May	Eng. & Brews. & (non-elec.) Distillers	P.P.P.
Those expecting earnings during current year to:						
Improve	54	46	45	48	48	83
Remain the same	27	27	30	32	36	8
Contract	15	22	22	18	16	9
No comment	4	5	3	2	—	—

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Shipbuilding men join forces to oppose industry run-down

BY RAY PERMAN AND JOHN WYLES

MORE THAN 400 ship stewards and convenors from every major shipyard in Britain and Northern Ireland have set up an unofficial combined committee pledged to resist the contraction of the industry after nationalisation.

At a meeting in Glasgow at the week-end, Mr. James Airlie, convenor at Govan Shipbuilders and one of the leaders of the work-in at Upper Clyde Shipbuilders, was elected chairman of the committee. He said yesterday that it would become a permanent feature of the industry.

The creation of the committee could have its first impact on the tripartite talks under way between the trade unions, the Government and the organising committee of British Shipbuilders. The Government is hoping that these will produce a common view on the problems facing the industry and subsequent union acquiescence in

what is believed to be an inevitable contraction. There is no clear view in Whitehall or anywhere else on how much the industry needs to shrink because of the depressed world shipbuilding market.

But a resolution passed at the Glasgow meeting declaring that industrial action would be used to oppose redundancies and yard closures will be seen by the

Hope grows of peaceful Namibia settlement

BY BRIDGET BLOOM, AFRICA CORRESPONDENT

HOPE THAT there will be negotiations leading to a peaceful transfer to majority rule in Namibia, South West Africa, increased here to-night as Dr. Henry Kissinger and Mr. John Vorster prepared for their third and final day of talks.

There was much less optimism that the discussions between the U.S. Secretary of State and the South African Prime Minister would lead to a settlement within three months — could result in a similar solution of the Rhodesian problem.

Dr. Kissinger and Mr. Vorster have so far spent some 12 hours in talks which have clearly centred on Rhodesia and Namibia rather than on the troubled situation in South Africa itself.

The talks, which both men have said are of paramount importance for the future of the whole of southern Africa, are being held in great secrecy at two of Zurich's smartest hotels.

The only communiqué so far issued followed last night's working dinner, in which a "progress is being made." No details have been given.

It is understood that a round-table conference including South Africa and the Namibian nationalist party, SWAPO, is on the cards within the next few months.

On Rhodesia, which Dr. Kissinger last week called the "most immediately dangerous" problem, it is felt here that although Mr. Vorster has exerted pressure on Mr. Ian Smith and may be prepared, covertly, to do more in the way of cutting back both arms supplies and trade outlets for Rhodesia, for political reasons, he is not ready to "turn off the tap."

Mr. Vorster to-day denied he was putting pressure on Rhodesia. "We can point out alternatives, we can point out realities, we can advise. That is as far as I went in the past and that is as far as I am prepared to go in the future."

Almost as important from the American viewpoint at this stage is the attitude of the front-line African presidents to Rhodesia. There remain important differences on the compensation plans for white Rhodesians, but the Presidents also

First titanium casting plant to go to development area

BY ROY HODSON

BRITAIN'S first titanium casting plant is to be built in a development area with Government financial support.

A joint company is to be formed by the British company Stone Manganese Marine and the American company TITech International of California, each holding 50 per cent. The site probably will be at a Stone Manganese plant but the two companies are withholding detailed information until unions have been consulted.

The initial installation will have two high-temperature melting furnaces and casting facilities involving an investment of about £2m. It is hoped to achieve a steady build-up in production after the plant opens in 1978 with capital investment continuing.

Mr. Edward Williams, president of TITech, was one of the pioneers of the still novel technique of casting this intractable metal. Although titanium is as strong as steel and only half as heavy and is one of the most corrosion resistant materials known to man it has presented problems to manufacturing industry. The high cost of titanium — it is five times more expensive than steel — can be offset by its

long life. For that reason, and because of its lightness, it has become established in aerospace applications. But it has proved difficult and expensive to work.

Casting techniques being promoted by Stone Manganese and TITech turn the peculiar properties of titanium to advantage. The metal is cast quickly and at high temperatures into a mould which is spinning and generating centrifugal forces of up to 60 times the force of gravity. As titanium is a metal with what scientists call "a natural affinity for itself it tends to pack closely during the spinning casting process. The result is castings free from imperfections and it is claimed, as strong as parts wrought by forging and ducted.

The inauguration of a new titanium casting industry in Britain by Stone Manganese and TITech and later IMI is not likely to sharpen demand for the metal. It may have the opposite effect for the casting process is economical in its use of titanium as there is almost no wastage.

Mr. Williams of TITech has plans to recycle titanium as much as possible in Britain and which may contribute further to depressing the market for newly-refined titanium.

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LORNEARD

Judging how far to squeeze

BY COLIN JONES

UP TO A POINT Mr. Peter Shore may have been on to something when he told local authorities that they should still be able to find ways of reducing their expenditure which would avoid redundancies. The latest analysis of their spending plans shows that just over half of this year's projected £300m. "overrun" beyond the figures agreed with the local authority associations last November arises from local rates subsidies for housing, bus and train fares, and local authority trading activities.

More pressing

Yet one suspects that it was not local profligacy with subsidies so much as more pressing political considerations which persuaded the Environment Secretary to tread circumspectly around the matter of redundancy. The continuing rise in unemployment has led to increasing hostility among the Government's supporters. The TUC annual congress takes place this week and the Labour Party conference is still to come. This is perhaps not the most propitious moment to provoke a clash with the more vociferous opponents of spending cuts, among whom are to be found public sector unions like the National and Local Government Officers' Association and the National Union of Public Employees. With luck, if the issue is judged until after the conference season is out of the way, the underlying unemployment trend might then be showing signs of improvement.

The timing is tight, however. By November, when next year's grants to local authorities have to be settled, it will no longer be possible to burke the issue whatever the unemployment figures show. If councils live up to their collective spending ambitions for this year, they will have to find cuts next year amounting in real terms to about 4.5 per cent. of their present revenue expenditure to keep within the Government's public expenditure guidelines.

A reduction of this magnitude is most unlikely to be achieved without a pruning of town hall staff, including the administrative core. Many councils have gone about as far as it is possible by drawing on natural wastage, reducing the level of their services, and dispensing with the services of outside contractors—thereby shuffling redundancies problems on to the private sector. Up to now, it has largely been a matter of moderating the overall rate of real growth in local revenue spending. This is no longer the prospect—because of this year's overspend.

To Mr. Shore's credit, he has already put local authorities on notice to expect rather less grant than they were counting on both during the remainder of the present year and in 1977-78. The idea is that by mopping up council's cash reserves—which had in part been inflated by Mr. Crosland's over-generous grant settlements a year ago—they will be forced into having to choose between bringing their spending back on course and extracting large additional sums from ratepayers shortly before many councillors come up for re-election next spring.

The grant mechanism is however a crude weapon. It tends to scatter its shot across the good and the bad alike. The leverage has been severely weakened by inflation. And the local vote is, at best, only partly influenced by the electorate's views of how well the local councils have been performing, and not just only in those places where one or another party tends to predominate.

Blow back

Indeed, the grant mechanism could easily blow back in the Government's face. If Mr. Shore squeezes local councils too far or if too many over-spenders choose not to fall into line, he could see another ratepayers' revolt next spring and Labour could have much to lose if the rates increase were made to seem the result of a central government decision rather than local over-spending. Mr. Shore will have to calculate nicely just how far he cannot expect to achieve next year's spending targets, engineer an acceptable level of rates increases, and still be able to avoid a major row with the public sector unions. His problem is that, because local authorities have autonomous tax-raising powers of their own, he may not even be able to ordain which of these three alms should be sacrificed.

CRICKET... SOCCER... TENNIS... RUGBY... RACING

Northants win their first major cricket trophy

NORTHANTS BEAT the firm favourites, Lancashire, by four wickets in the 59th over of the Gillette Cup final before the occasion's usual capacity crowd at Lord's on Saturday, giving their first major title.

They deserved their victory, which could have been, but for the tactical naivety of their captain and an understandable tendency of their later batsmen to panic, even easier.

There is a place, and there always has been, for quality spin bowling in limited-over cricket. The tactical error of mis- placement resulted in 26 runs being plundered off the unfortunate Badi, who until then had bowled quite beautifully for Northants. What made it all the more strange was that Dye had only bowled seven over for nine runs, taken a wicket and removed the unlucky Wood from the contest.

There was no way that Hughes, with a perfectly timed, but very late, delivery, could have taken 26 runs off the left-arm pace bowler. Possibly 10

would have been the maximum the innings, without quite increasing the tempo sufficiently for the needs of the situation. Both eventually fell to the wiles of Badi, and Lancashire seemed condemned to finish with a total of under 180 until that burst of fierce hitting by Hughes in the final over.

Virgin and Willey provided the Midlands with a sound and eminently sensible start. They negotiated some difficult overs before the new ball but never fell into the common trap of being too cautious and dropping away behind the asking rate. The experienced Virgin was content to watch his naturally aggressive young partner assume the dominant role, and when the 100 came up in 31 overs the former had long since completed his 50, which included the most handsome strokes of the match.

Willey—why doesn't he open in three-day county matches?—was eventually caught behind for 85, which won him the man-of-the-match award. Virgin was next to depart, after he had reached his 50, and from then on Northants staggered rather unceremoniously towards eventual victory.

TREVOR BAILEY

Arsenal and City disappoint a lot of high expectations

WHILE the best things in London and Manchester soccer were happening elsewhere, Arsenal and Manchester City disappointed a lot of high expectations in a goal-less draw at High-bury. It proved, if proof were needed, that it will take deeds, not words, to transform the boring methodists of Arsenal into exciting crowd-pleasers in concert with the new image one expects of a side managed by Mr. Terry Neill. . . . and deeds, not words, to transform Manchester City away into more accurate replicas of the side that excels at Maine Road.

However, it was a worthy match, crammed with plenty of defensive efficiency, which, compresses into deficiency as far as the average goalseeking spectator is concerned. And who is to blame him? For 90 minutes of dour, diaphanous industry are insufficient reward for the substantial investment demanded these days for a season ticket, a stand seat, or even a terrace place at an upper-crust division one club.

While on the subject of returns on investment, if Mac-

donald is worth £333,000 for Arsenal, how much then is the value of Manchester City captain Doyle, who played a high-bury's most costly recruit out of the game?

Macdonald breathed fire, moved menacingly and shot strong, long, and wide a couple of times during the first half, during which Doyle needed treatment for leg trouble, although yielding little of significance. But, for the last hour of the game, Doyle's command in the air, his superb anticipation and the speed and assurance with which he carried out the task of blunting Macdonald made his work look simpler than it was.

While it would be unjust to say that Manchester City concentrated on defence, Arsenal were able to contribute most of the attacking thrust forward by attacking rearguard. It is incredible that, while other England World Cup heroes of 1966 have retired to undertake or other morbid occupations such as football management, Ball alone is still performing dynamically as a brains-plus-

energy man in the powerhouse of a First Division side. Clearly not so important are Arsenal's other long-service men, Rice and Simpson. Manchester City's expensive signings Watson, Royle, Hartford and Tuerat made little impression, too. Yet Docherty, son of the Manchester United manager, incredibly freed at the end of last season by Burnley, a club which survives and flourishes thanks to its superb salesmanship of players, fully justified his place. Conway, who seemed perceptively and as with an established writ, in City's attack, looks a fine bargain from Fulham at £30,000.

JAMES FRENCH

Merit table of English rugby expected

IT WOULD seem that Twickenham was the scene of lively discussion on Friday when among other things the future nature of the county championship was discussed. It emerges that the Northern group took the firmest line and that the championship will stay for the present.

What seems odd is that the majority of players I have spoken to do not want it. However, I understand that an English merit table will be instituted and this, the latest step forward, is perhaps a response to the Anglo-Welsh merit table now in force.

Against the background of debate and perhaps dispute, the season is under way at all levels and I will discuss in a later article the view of a junior club chairman on the recent topic of the malaise of English rugby.

Clifton opened their new ground and clubhouse yesterday, an entertaining W. J. McBride's in the process. It was a nice gesture by the home club to collect for those who have less generous facilities.

The new club complex reflects well on Clifton and it is a heart-warming fact that the same efforts are being made in clubs throughout the land with the help of the RFU, county unions, and brewers—naturally—but mainly through club efforts.

Kindest thing

Perhaps the kindest thing that could be said of Clifton's effort was that they won the second half 34-32 but conceded 52 points in the first period and so lost 86-34. Clifton's best performers were in the second row, including Cannon at scrum half, who made some delicate breaks, the left wing Lowe and Johnson in the centre.

If Clifton are to match their surrounds they must first improve their tackling, which was woeful. Luxmore showed how on Ripley and Lowe on Dunsford, but otherwise only the visitors' errors kept the score down.

However, they will have learned much from the encounter as will the many young people present. This was possibly the major purpose of the game.

It was good to see Duckham back and with the ball. He went off injured at half time, being replaced by Martin of Clifton.

PETER ROBBINS

Britain's big tennis hope beaten

NEW YORK, September 5

THE first four days of the \$418,000 U.S. Open have been blessedly cool—but there has been plenty of heat and controversy as six of the 16 men's seeds and seven of the selected women have been eliminated.

Only when Miss Wade lost high, booming drives to the line was her opponent at all harassed but the merits these tactics either did not go to her or fell outside her conceived idea of how the game should be won. It was all familiar to her: Miss Wade's game refused to compromise against an opponent who gave too few problems and many gifts. Afterwards Wade said: "I was unlucky meet as good a player as I have when there are so many players in the draw."

A British survivor was Barker, No. 9 seed, who Sharon Walsh of California, 6-1 and now faces Australian Guleray, a 7-6 6-4 winner on Saturday against young Kent girl Michele Ty. Guleray, a 19-year-old, another "just-by-virtue of 3-6 7-6 7-5 victory" against another Californian, M. Struthers.

JOHN BARRE

Millionaire seems headed for sterling victory

WITH THE St. Leger, which will be attended by the Queen, now only six days away, nearly all the riding plans have been completed. Lester Piggott, whose name has at one time or another been linked with a high proportion of the runners, including the first and second favourites, Marquis de Sade and Camperdown, confirmed on Friday that he will be aboard the Henry Cecil-trained General Ironside, whose chances seem slim at best.

Piggott, whose record in England's classics is unequalled by any other jockey this century, missed an eighth St. Leger last year when he opted for King Pellinore in preference to Bruni.

It was hoping that Welsh, an own brother to Welsh, can make up for a costly Rye Venture by taking the Rye Nursery, in which Red John is another with strong claims.

WINDSOR

2.15—Roman Star
2.45—Rosella Bala
2.55—Welsh Friend
3.45—Millionaire
4.15—Camperdown
4.45—Eradicator
5.15—Out of Season

HEXHAM

2.15—Silver Gal
2.45—Old Steven
3.15—Pirate Gold

DOMINIC WIGA

Radio

† Indicates programme in black and white

BBC 1

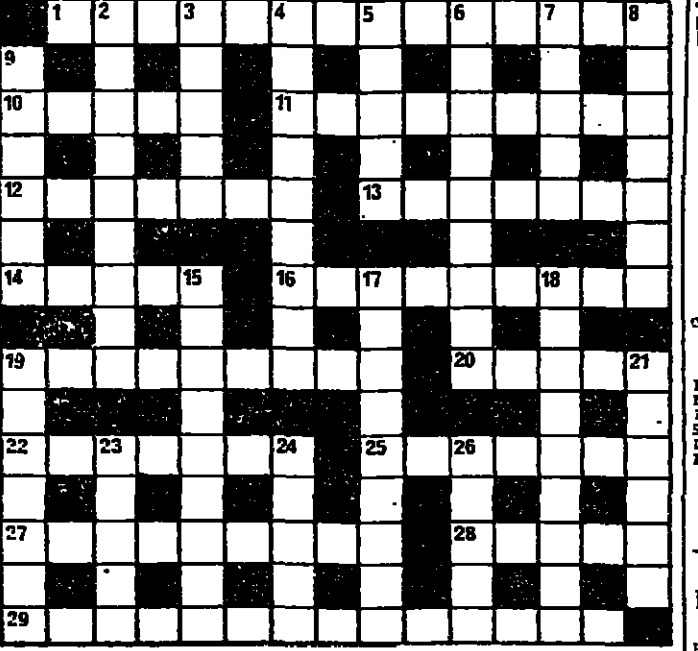
7.05 a.m. Open University (UHF only). 12.45 p.m. Mid-day News. 1.00 Public Mill. 1.45 Trumpton. 2.00 TUC Congress report to 4.30. 2.40 Generation to Generation. 4.18 Regional News (except London). 4.30 Play School. 4.45 Go With Nokes. 5.10 Play Away. 5.40 News. 5.55 Some Mothers Do Awe 'Em. 7.30 Angels. 8.10 Panorama. 9.00 Nine O'clock News. 9.25 Dink Bonadere, in "The Mind Benders". 11.10 The War Lords. Talk by

A. J. P. Taylor.

BBC 2

11.40 Weather/Regional News. All Regional programmes as BBC-1 except at the following times: Wales—4.55-5.00 p.m. Pili Pala. 5.55-6.00 Wales Today. 6.50-7.00 Heddidi. 11.40 News and Weather for Wales. Scotland—5.55-6.30 p.m. Report from Scotland. 11.40 News and Weather for Scotland. Northern Ireland—1.18-1.20 p.m. Northern Ireland News. 5.55-6.25 Scene Around Six. 6.25-6.50 Land 'N' Larder. 11.40 News and Weather for Ulster. 6.40 a.m. Open University. 11.00 Play School.

F.T. CROSSWORD PUZZLE No. 3,175



- 1 Calm down and produce music personally (7)
2 Ring bachelor assembly for a fixed idea (8)
3 Good taken after one? (5)
4 Shares true revision in handwriting (9)
5 Possess unusual pride initially but confess (3, 2)
6 Tirade involved with oil on the leader page (9)
7 The best in society, literally surrounded by Orientals (5)
8 Craft or splendid ship going to the east (7)
9 The start of terrorism with smoke rising is disastrous (6)
10 Offers of marriage and support with love upset last (9)
11 Agile, making airman pinch with a twitch (9)
12 Bet on team left in and relapse (9)
13 Self right for fish (6)
14 Prude badly concealed (5)
15 Everything belonging to me is wood (5)
16 What is required to measure resistance (5)
17 Calm down and produce music personally (7)
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19 Shares true revision in handwriting (9)
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27 Bet on team left in and relapse (9)
28 Self right for fish (6)
29 Prude badly concealed (5)
30 Everything belonging to me is wood (5)
31 What is required to measure resistance (5)

The solution of last Saturday's prize puzzle will be published with names of winners next Saturday.

LONDON

9.45 a.m. Sally and Jake. 10.00 The Saracen. 10.55 Sixty Years. 11.45 Carillon Time. 12.00 Issi Nono. 12.10 p.m. Clap. Kitchen Garden. 1.00 First Report. 1.20 Lunch-time. Today. 1.50 Marked Personal. 2.00 Good Afternoon. 2.30 Trades Union Congress. 2.50 Emmeline Pankhurst. 3.00 perboard. 4.45 The Tomorrow People. 5.15 Batman. 5.45 News from ITN. 6.00 Today. 6.45 What's On Next? 7.00 Coronation Street. 8.00 George and Mildred. 8.20 Piller. 8.50 The Sweeney. 10.00 News At Ten. 10.20 The Playwright. 11.20 London-New York. 11.40 Dan August. 12.25 a.m. Andrei Snitsky's "Un-guarded Thoughts". All ITV regions as London except at the following times:—

ATV MIDLANDS

11.30 a.m. Phoebe. 11.55 Keep Britain Slim. 12.30 Mid-day News. 1.00 p.m. The Tomorrow People. 1.20 Lunch-time. Today. 1.50 Marked Personal. 2.00 Good Afternoon. 2.30 Trades Union Congress. 2.50 Emmeline Pankhurst. 3.00 perboard. 4.45 The Tomorrow People. 5.15 Batman. 5.45 News from ITN. 6.00 Today. 6.45 What's On Next? 7.00 Coronation Street. 8.00 George and Mildred. 8.20 Piller. 8.50 The Sweeney. 10.00 News At Ten. 10.20 The Playwright. 11.20 London-New York. 11.40 Dan August. 12.25 a.m. Andrei Snitsky's "Un-guarded Thoughts". All ITV regions as London except at the following times:—

RADIO 1

6.00 a.m. Radio 1. 7.00 News. 7.15 The Today Programme. 8.00 News. 8.15 The Today Programme. 9.00 News. 9.15 The Today Programme. 10.00 News. 10.15 The Today Programme. 11.00 News. 11.15 The Today Programme. 12.00 News. 12.15 The Today Programme. 1.00 News. 1.15 The Today Programme. 2.00 News. 2.15 The Today Programme. 3.00 News. 3.15 The Today Programme. 4.00 News. 4.15 The Today Programme. 5.00 News. 5.15 The Today Programme. 6.00 News. 6.15 The Today Programme. 7.00 News. 7.15 The Today Programme. 8.00 News. 8.15 The Today Programme. 9.00 News. 9.15 The Today Programme. 10.00 News. 10.15 The Today Programme. 11.00 News. 11.15 The Today Programme. 12.00 News. 12.15 The Today Programme. 1.00 News. 1.15 The Today Programme. 2.00 News. 2.15 The Today Programme. 3.00 News. 3.15 The Today Programme. 4.00 News. 4.15 The Today Programme. 5.00 News. 5.15 The Today Programme. 6.00 News. 6.15 The Today Programme. 7.00 News. 7.15 The Today Programme. 8.00 News. 8.15 The Today Programme. 9.00 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by RONALD CRICHTON

JOHN BAY
ms head
Orv

by DOMINIC GILL

DOMINIC P.

by B. A. YOUNG

Nottingham autumn theatre season

The Financial Times Survey entitled 'Australia' which was to have been published on August 31st will now be published within the newspaper on September 8th 1976.

by ELIZABETH FORBES

Peggy Troman and Julian Moyle

by: ELIZABETH FORBES

Roundhouse Downstairs

by MICHAEL COVENEY

To some people the Windsor Pop Festival of 1974 signified a lot, to most it means a few stazy pictures in the popular Press of harassed policemen coping with likeable longhairs. It offers much more than we get from the Lovely and Talented Theatreband in this sloppy weak-kneed throwback to the original British publicising of the "Cultural Revolution". The "people's festival" was no such thing, and the show tantalisingly hints at that with the occasional sketch involving a mercenary hot dog vendor, a bone-head hippie or a stoned man.

The hippie figure is on the run, from an equally boring marital partner and his ten-month old child. This tale of domestic confusion in the echo of the big sounds is abandoned as easily as it is adopted. And the same energy which has produced the band's fascinating fantasia on the police infiltration of the event before dropping it in favour of more music from the

able and excellently amplified rock quartet. When the police chief appears disguised as a stand-up comedian to entertain the fans with jokes about themselves—the tone of the evening is, alas, finally clinched.

Before that we are invited to laugh at the mauling hippies who have been reduced to a sampled track from the album he is hoping to record called "Despair," and he is prelude to the band themselves doing to a reasonably funny bad rock routine that is delightfully interrupted by two women who begin accusing the drummer of "going a bit fast" and the bass guitarist of possessing a worn A-string.

The music is very enjoyable, the theatrical achievement minimal. What this group needs is a writer with something interesting to say and a director who shares my conviction that the Lovely and Talented Theatreband could yet come up with a real rock musical. Well, at least something better than *T. Zee*.

An unperformed Russian dramatic classic and rarely performed American German and French plays join three English comedies and a new play to make up the seventh season of the Citizens' Theatre Company directed by Gilles Havergal.

The season opens on September 10 with the first presentation outside Russia of Lermontov's classic Maskerade, now translated into English by Robert David MacDonald, associate director of the Citizens' Company, who also directs the production.

Maskerade will play in repertoire with Brecht/Wells' The Seven Deadly Sins, The Lower Middle Class which opens on September 24. This play will be directed by Geoffrey Cauley, working with the Citizens' Company for the first time, and the designs are by Philip Prowse.

What the Butler Saw opens on October 22. Directed by Gilles Havergal and designed by Geoffrey Rose, this will be joined on November 12 by American author Paul Foster's fairground history lesson, Elizabeth I.

by B. A. YOUNG

Edinburgh Festival

by RONALD CRICHTON

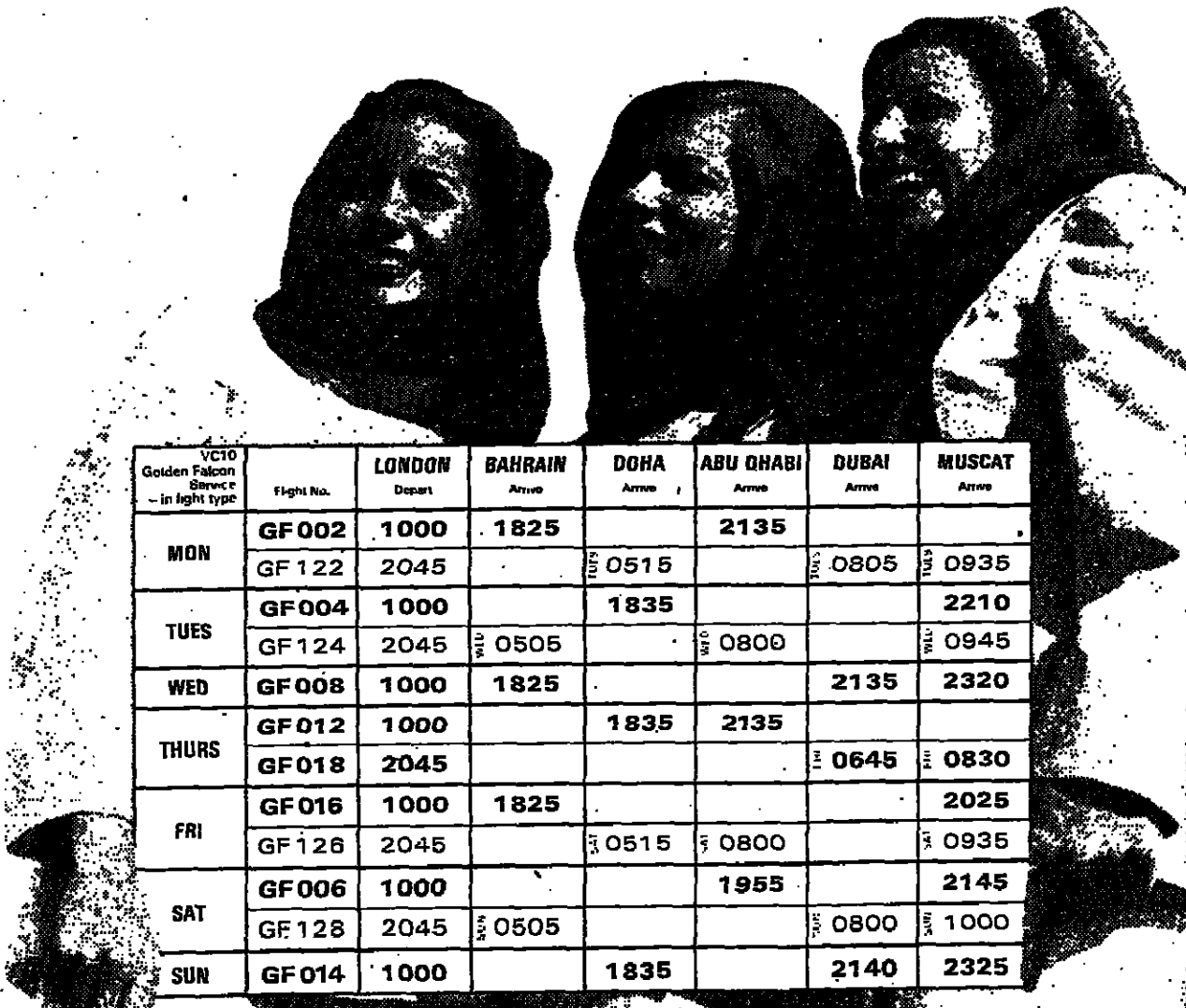
If ever it should become necessary to look at the Edinburgh Festival in the past rather than the present, one of the most valuable and enduring of the musical memories will undoubtedly be the morning chamber concerts in Freemasons' Hall. Since they leave little time for writing or seeing exhibitions and what-not, they add yet more to the impression of being under a heavy load, but the burden is gladly borne for the generally high standard, for the wide repertory (where else can one catch so much unfamiliar—not to mention new—European music?), for the variety of performers, ranging this year from big stars like the Vermeer and Alban Berg Quartets and Alicia de Larrocha to recently established younger artists like Yehudi Menuhin and the younger Marius May. And—not least important—there is the hall's excellent sound.

On Thursday last the Polish violinist Wanda Wilkomirska, heard as soloist two nights earlier with the Gewandhaus Orchestra, gave a recital providing exactly the kind of enjoyment and interest one associates with these concerts. Beethoven's "Spring" Sonata at the beginning was, as music, on a lonely pinnacle, but the Sonatas by Grieg (No. 3) and Debussy were valuable not only for the exceptionally vivid performances they received, but for the light they threw on post-Beethovenian struggles with sonata form, and mutually on one another—Debussy being, I think, though younger, friend of Grieg.

The Norwegian's material is fresh, charming, personal, but fitting it into a formal sonata framework is like dressing a young milkmaid in whalebone corsets. Debussy's ideas are personal, certainly, but less striking, and he is more successful in devising a rhapsodic yet congenial formal scheme. Equally illuminating was the pairing of Wienawski's *Polonaise brillante* in A with Szymanowski's *Notturmo e tarantella* (in that order), showing that the former is not all gross and that behind the heady impressionistic shimmer of the latter there is a fair dose of the older kind of virtuoso writing.

On the previous morning, the American Brass Quintet from New York worked bravely and courageously with Canzonas by Giovanni Gabrieli and a suite of English Masque music by William Lawes and others, followed by a new work, *Otherworldly*, by Jacob Druckman. This had the efficiency one would expect from a Pulitzer Prize winner (for an earlier piece commissioned by the Chicago Symphony Orchestra) but alas, it turned out to be of such unrelieved, pressurized hardness that it came down to the Bakst Exhibition.

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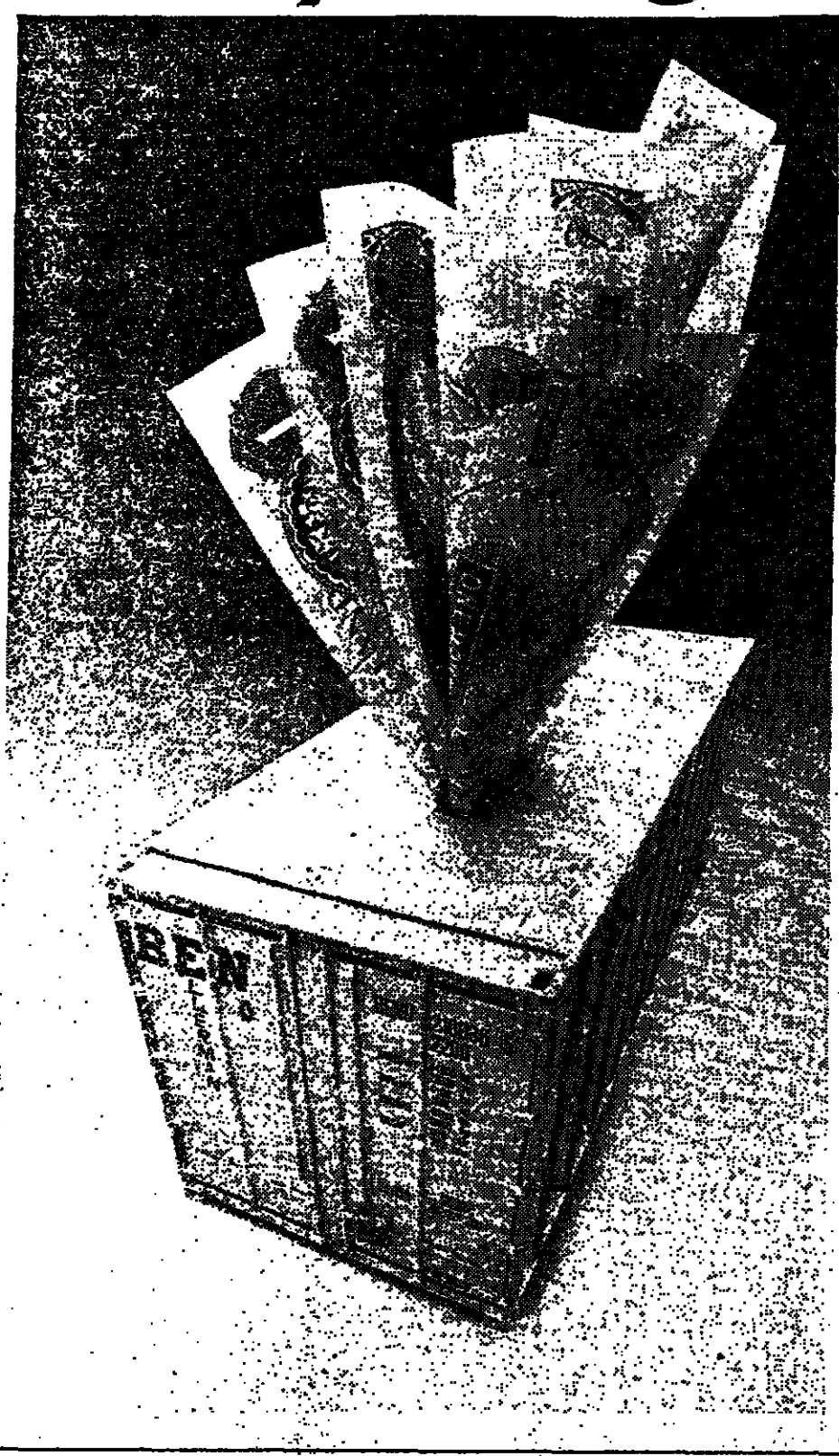
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LEGAL NOTICES

IN THE HIGH COURT OF JUSTICE
In the matter of the Winding-up of the above-named Company, the Matter of the Companies Act, 1948.

NOTICE IS HEREBY GIVEN that a Petition for the Winding-up of the above-named Company, the Matter of the Companies Act, 1948, was presented to the said Court by the said Petitioner on the 24th day of August 1976, and that the said Court has appointed the said Petitioner as Liquidator of the said Company.

NOTICE IS HEREBY GIVEN that the said Petitioner is directed to call a meeting of the creditors of the said Company to be held at the said Court on the 24th day of October 1976, at 10.30 a.m. for the purpose of ascertaining the claims of the creditors of the said Company and of the said Company's assets and of the said Company's liabilities and of the said Company's income and of the said Company's expenses and of the said Company's profits and of the said Company's losses and of the said Company's other matters.

NOTICE IS HEREBY GIVEN that the said Petitioner is directed to call a meeting of the shareholders of the said Company to be held at the said Court on the 24th day of October 1976, at 10.30 a.m. for the purpose of ascertaining the claims of the shareholders of the said Company and of the said Company's assets and of the said Company's liabilities and of the said Company's income and of the said Company's expenses and of the said Company's profits and of the said Company's losses and of the said Company's other matters.

NOTICE IS HEREBY GIVEN that the said Petitioner is directed to call a meeting of the creditors of the said Company to be held at the said Court on the 24th day of October 1976, at 10.30 a.m. for the purpose of ascertaining the claims of the creditors of the said Company and of the said Company's assets and of the said Company's liabilities and of the said Company's income and of the said Company's expenses and of the said Company's profits and of the said Company's losses and of the said Company's other matters.

COMPANY NOTICES

M.L. HOLDINGS LIMITED
ORDINARY SHARES OF 25p
7.7p Debenture Stock 1986/91
NOTICE IS HEREBY GIVEN that the Transfer Books and Registers of Members of the above-named Company will be closed from 25th September 1976 to 25th October 1976, both dates inclusive.

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7.7p Debenture Stock 1986/91
NOTICE IS HEREBY GIVEN that the Transfer Books and Registers of Members of the above-named Company will be closed from 25th September 1976 to 25th October 1976, both dates inclusive.

THE COLSON GROUP
NOTICE IS HEREBY GIVEN that the Transfer Books and Registers of Members of the above-named Company will be closed from 25th September 1976 to 25th October 1976, both dates inclusive.

HEPWORTH CERAMIC HOLDINGS LIMITED
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An additional amount of FF 2,400,000 has been purchased pursuant to "Optional redemption" of the terms and conditions of the Bonds.

Taking into account the optional redemption of FF 1,600,000 redeemed on October 25, 1975, the amount outstanding is FF 68,800,000.

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Luxembourg, September 6, 1976.

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HOME NEWS

Court action to-day by Cunard over Maritime

By John Wyles, Shipping Correspondent

COURT action and negotiations with bankers will be launched to-day by the Cunard Steam Ship Company in its \$112m. (£62.5m.) bid to acquire 13 U.K.-registered refrigerated cargo ships, mainly owned by Maritime Fruit Carriers.

All the ships are under the control of Maritime's creditors and one, the Orchidea, is due to be auctioned by Britain's Admiralty Marshal to-morrow.

Averting this sale is one of Cunard's first priorities and the company will seek a court injunction to postpone it pending negotiations with leading creditors.

Cunard, a subsidiary of Trafalgar House Investments, reached a surprise agreement on Friday with Maritime Fruit which, if successful, will make the British company an important force in the transport of fruit and perishable cargoes. The deal could have a vital bearing on Maritime's times and may strengthen the Israeli-American company's attempts to find a way of going ahead with ships it has on order at British yards.

Captain Milla Brenner and Mr. Yacov Meridor, Maritime's joint managing directors, yesterday issued a statement claiming that the Cunard agreement would alleviate considerably the company's financial situation because it would be better able to deal with balancing charges arising from sales under this contract, than under forced sales.

Tax charges

The ships Cunard wants to buy are owned by Maritime subsidiaries which will be liable for tax repayments once the vessels are sold. Yesterday's statement appears to suggest that proceeds from the sales, together with "substantial non-utilised tax allowances in the group from new buildings and some losses," will give the company some means of meeting tax charges.

There has been no indication of how much, if any, cash will find its way back to Maritime should the deal be concluded by Cunard's gaining control of the ships. It is understood that only about half the \$112m. contract price will be provided in cash and most of this will be earmarked for secondary mortgages.

CBI produces guide to Fair Trading Act

UNDER the aegis of its new director-general, Mr. John Methven, former director-general of fair trading, the Confederation of British Industries has produced a guide to the Fair Trading Act. The booklet gives an outline of the Act covering the functions and responsibilities of the director-general of fair trading and the Consumer Protection Advisory Committee as well as the legal position on monopolies, mergers, restrictive trade practices and pyramid selling.

In his foreword Mr. Methven says that, when he was at the Office of Fair Trading, he found a "lack of knowledge among many traders concerning their legal obligations to customers."

The new booklet is designed to complement the introductory guide published recently by the Office of Fair Trading.

Fair Trading—guidance for industry and commerce; available from CBI Print and Publications Department, 21 Torrhill Street, London, SW1H 9LP; £2.00.

Westland announces robot helicopters at Farnborough

BY MICHAEL DONNE FARNBOROUGH, Hants. Sept. 5.

IT IS much more than an "air show gimmick" and they can foresee a substantial market emerging for the device in the years ahead.

It was also disclosed here to-day that the Boeing 747 Jumbo jet equipped with the Rolls-Royce RB-211 engine successfully flew for the first time last Friday from Everett Field, near Seattle. This is a significant development for the Rolls-Royce RB-211 engine.

The RB-211, powered Jumbo has already been ordered by British Airways, with deliveries of six aircraft due to begin in April 1977, and the engine—the up-rated 50,000 pound thrust version called the 624—is also being installed in later versions of the Lockheed TriStar airliner.

The flight test programme now about to start is expected to result in substantial orders for this engine-airframe combination in the years ahead.

It was also announced here to-day that Lockheed of the U.S. at its Atlanta, Georgia, base, has now completed preliminary design work at economic studies for a new high-capacity, low-cost cargo aircraft which will be a derivative of the famous Hercules freighter.

Designated the L-100-50, it is aimed at the world's military and civil cargo markets for short and medium haul operations.

It is claimed that the aircraft will provide lower costs per ton-mile for states up to 1,500 miles than any other new production freighter in its class.

Lockheed is now undertaking a world wide sales campaign for the aircraft and expects to be able to announce the first orders soon.

Shaw adopts new carpet print process

BY RHYS DAVID, CHEMICALS CORRESPONDENT

A NEW round of competition in the already keenly-contested U.K. carpet market is likely to be set concentrated near the surface where the carpeting has been in contact with the rollers through which the dye has passed.

The new printer will add a further 5m. square yards a year of printing capacity in the U.K. which already has around 70m. yards capacity—enough to satisfy the market twice over. Shaw is expecting its carpet to compete more heavily with wovens than printed because of the quality of print that is achieved.

Shaw will be starting with a five colour capability but will be building up to eight colours next year, making it possible, according to James Hartley, the chairman, to reproduce designs in the more expensive part of the market held by wovens.

Shaw, which last year had a turnover of £18.3m., is hoping that the new Millitron printing technique will enable it to side-step present serious over-capacity in tufted carpet printing in the U.K. and give it sales in the more expensive part of the market held by wovens.

Shaw, which intends to price the Millitron carpets at around £5-6 per square yard—roughly the same as the wovens—will be the first company to back its Millitron carpets with a conventional woven backing instead of foam.

The Millitron equipment, which has cost Shaw £15m., injects dye onto the carpeting through thousands of small jets individually computer controlled and spaced along a machine at 100 per square inch.

This technique is claimed to be licensed by Deering Milliken, provide much better dye fixa- tion and depth of colour than can be obtained by conventional Four other licensees are being approached by Shaw, including a second U.K. licensee, probably to print much deeper pile tufted carpets than has previously been in about two years.

The Treasury has said nothing so far about the size of the deficit next year and there are differences between the forecasts of the projected rate of improvement.

The most striking contrast between Treasury and other forecasts is in an area where there has been a specific projection has covered the expected rate of growth of world trade, and hence the expansion of exports and Gross Domestic Product.

On world trade, the accompanying table shows how the Treasury paper to the Waddy Council was, for both the growth "scenarios," assuming a much higher rate of expansion than other projections, including, for example, the recent one from GATY. This is reflected in the difference between the Treasury "past trend scenario" expansion of 4 per cent. next

ECONOMIC PROJECTIONS		London Business School	Phillips & Drew	Wood Mackenzie & Co.
Government	National Institute			
World Trade	1976/75 14% 10% 11.1% 11.2% 9%			
Exports of goods	1977/76 13% 8% 11.2% 11.2% 9%			
Personal consumption	1976/75 0.75% 1% 0.8% 0.8% 0.2%			
Gross domestic product	1977/76 1% 0.5% 1.5% 1.5% 1.2%			
Stockbuilding	1976/75 31% 3.5% 3.7% 3.7% 1.8%			
Balance of payments	1976/75 41/51% 3.6% 4.0% 4.0% 2.4%			
current account deficit	1976 1977	£15.1/1.7bn. £1.9bn. £1.9bn. £1.9bn. £1.36bn.		

The above forecasts of percentage changes are constant 1970 prices comparing one year with another. The Government projections cover the range in the Treasury "scenarios" presented to the Waddy Council next month. While they were intended to be for illustrative purposes, the figure suggest, for at least the next 18 months, the range of current Treasury thinking. The Government current account for projection is an up-to-date rather than a representative sample, that exclude the projections produced, for instance, by the Henley Centre and data STREAM.

Brokers to be told 'Talisman' strategy

By Michael Lafferty

THE STOCK Exchange chairman, Mr. Nicholas Gooding, will be writing to members within the next month setting out the SE Council's strategy for implementation of "Talisman," the new computerised settlement system due to go into action in 1978.

The first two stages of the scheme—the computerised checking of deals between brokers and jobbers and a method of bargain accounts—are already in operation.

It has been estimated that the extensive paperwork involved in the present "tick" method of settling, will cost member-firms about £2m. a year, but savings are expected to amount to £15m. annually at 1975 prices. The capital cost of setting up the system is at least just under £10m.

Doubts have recently been expressed about the financial implications of the scheme which is designed for a big active stock market, for 8 firms. The level of Stock Exchange business is now very low and few brokers are believed to be making adequate profits.

Firms have already begun to explore whether there are less costly ways of avoiding jobs, as brokers having to face high charges at times of low business.

The Stock Exchange has some time been holding what it describes as "normal" conversations with the promoters of ARIEL, the computerised share dealing system sponsored by the Acceptance Houses which was set up a few years ago in competition with the Stock Exchange.

The aim of these talks is to explore whether there are less costly ways of avoiding jobs, as brokers having to face high charges at times of low business.

Spain flights up to ten hours late

Financial Times Reporter

TRAVELLERS to Spain continued to suffer long delays yesterday. Some passengers had to wait up to 10 hours as a result of the Spanish air traffic controllers' dispute.

Though the Spanish tour office in London said things were not expected to be as bad as last week because there was no late traffic in Spain, Heathrow, where the delays were reported, the disruption was harder than ever.

Passengers crowded into a departure lounge and extra flights had to be provided. Airlines said thousands of inbound travellers were delayed in Spain.

Manchester airport reported delays of nine hours, caused "chaotic" conditions that in up flights to other European countries. At Gatwick, where there were 85 flights to and from Spain, travellers were having to wait for up to four hours in the afternoon. The Gatwick authorities warned that things were "bound to get worse later."

At Liverpool there were delays apart from one flight. Barcelona held up for 10 hours.

More Home News, Pages 8 and 32

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OVERSEAS NEWS

Spanish Opposition parties hold summit

BY ROGER MATTHEWS MADRID, Sept. 5.

THE SERIOUS political and economic difficulties facing Spain this autumn were emphasised at the weekend when the main opposition parties held a summit meeting of most of the country's main Opposition parties reiterated a series of demands all of which have so far proved unacceptable to the present Government.

The meeting, attended by nearly 100 delegates representing the main opposition parties from the far Left to the Centre, regional organisations and workers groups, was held by some participants as the most important Opposition gathering since the end of the Civil War.

After an all day debate in Madrid, the delegates agreed that it was important for the democratic Opposition to speak with a single voice in its dealings with the regime.

Their basic programme would be to bring about a constitutional period which would have its essence full democratic liberties, freedom of trade unions, a total political amnesty without exclusions, and the recognition of the political right of Spain's different regions.

These aims would be pursued by intensified efforts to coordinate Opposition activity and by the calling of massive peaceful demonstrations. A special committee is being set up to coordinate co-operation between the different parties.

The final communiqué described the policies of the Government led by Senor Adolfo Suarez as failing to advance towards a negotiated settlement of the country's political future. Instead, the Government was said to be falling back on methods and plans that had already been proved to be failures.

However, the Opposition parties remained open to negotiations and considered that these should be carried out publicly with a previous guarantee of full freedom for all political and union organisations.

Senor Suarez and at least two other members of his Cabinet started initial exploratory talks with several Opposition and trades union leaders last month but the impetus seems to have diminished sharply amid rumours of dissension within the Government.

The Minister for union affairs has been forced to say that his contacts with illegal trade unions had been on "a personal basis" while a news blackout has been imposed on any documents put forward for Cabinet discussion.

In the industrially important north-eastern region of Catalonia, the major political parties issued a statement today calling for mass demonstrations next Saturday in support of local autonomy. The most notable absentee from the week-end Opposition meeting were several Catalan parties who were said to be negotiating directly with the Government.

Nationalists in Dar talks

BY OUR OWN CORRESPONDENT DAR ES SALAAM, Sept. 5.

THE PRESIDENTS of Zambia, Mozambique, Tanzania, Botswana and Angola arrived here today for a summit to-morrow which could make or break U.S. Secretary of State Henry Kissinger's plans for a new diplomatic initiative in Southern Africa.

The Presidents began talks today with representatives of Namibian and Rhodesian nationalist movements but their formal summit will not start until to-morrow.

The meeting here is taking place at the same time as Dr. Kissinger's Zurich talks with Mr. Vorster. A senior aide of Dr. Kissinger is expected here on Tuesday to consult with President Nyerere on the results of both the summit here and the Zurich talks.

Dr. Kissinger is waiting for a recommendation from the Dar Es Salaam summit on whether he should try Middle East-style shuttle diplomacy in an attempt to solve the Namibian and Rhodesian issues.

The Presidents' meeting here had planned to hold a summit at about this time in any case, and

VW may pay off losses

By Adrian Dicks

BONN, Sept. 5.

VOLKSWAGEN, reporting strongly improved results for the first half of 1976, held out to shareholders this week-end the possibility that, if present demand conditions are maintained, it may be possible to pay off the company's DM683m (£134m.) of carried forward losses.

The VW letter to shareholders did not put a figure on its financial results for the first six months of this year. But it left the impression that the DM134m. profit achieved during the first three months was at least maintained.

The letter also avoided setting a date by which VW may now hope to pay off its heavy past losses. The new chairman, Herr Toni Schmuecker, has limited himself only to saying that it was hoped to contribute towards paying off the carried forward losses this year. But he has not mentioned the possibilities of paying them off entirely.

VW saw its turnover rise by 20 per cent. to a new level of DM11.1bn., with booming domestic West German demand once again apparently the main contributor. Home turnover was up 29 per cent. and overseas turnover up 15 per cent., to a new level of DM7.7bn.

Herr Schmuecker also reported that VW had once again slightly increased its workforce.

Terrorism laws will curb Ireland's Press

BY OUR OWN CORRESPONDENT DUBLIN, Sept. 5.

IRISH newspapers will have their activities curbed and editors could face imprisonment under the Government's package of anti-terrorist laws now going through Parliament.

This has become clear from remarks made by two members of the Government in the last few days. They indicated that newspapers as well as individuals would be subject to Section 3 of the proposed Criminal Law Bill.

This would make it an offence, carrying up to 10 years' imprisonment, to incite or invite other persons to join an unlawful organisation or take part in support or assist its activities.

Suggestions that the Section would apply to the Press were first confirmed in an interview given to the Washington Post newspaper by the Minister for Posts and Telegraph, Dr. Conor Cruise O'Brien. Dr. O'Brien said he had a file of letters to the editor published by the Irish Press, and while the new measure would hardly be used to jail the letter writers it might be used against papers which published these letters.

Dr. O'Brien is expected to make a statement on this subject during the continuing debate in the Dail this week in a radio interview to-day. The Parliamentary Secretary to the Prime Minister, Mr. John Kelly, said there was nothing secret or special about news-

Soames, Stoel mission to reassure Ankara

BY DAVID CURRY BRUSSELS, Sept. 5.

THE DUTCH Foreign Minister, Max van der Stoep, and the Community's External Affairs Commissioner Sir Christopher Soames go to Ankara to-morrow to try to clear the way for the negotiations towards a new agreement between the EEC and Turkey.

The mission is essentially to reassure the Turkish Government that relations with Ankara command high priority in the EC but at the same time to urge Turkey to be realistic in its expectations of what the EC can offer to improve commercial and economic relations.

EEC-Turkish relations have been on the slide for some time. The decision to start negotiations on Greek membership of the EEC ranking bitterly in Ankara. On top of that Turkey's association agreement with the Community, which was a set-back in its time, has been made to look very ordinary by recent records reached by the Community with Mediterranean countries.

To reassure the Turks, the Community has offered to renegotiate the agreement to bring it more into line with the recent series of Mediterranean accords and to some extent to restore its unique status — a status derived from the fact that it foresees eventual Turkish entry to the EEC.

In March when Turkish discontent came to a head, EEC Foreign Ministers promised proposals to improve the agreement in time for a meeting in July. But it proved so difficult for the EEC States to reach agreement among themselves on their negotiating position that the Turks were given only four days before the scheduled meeting to examine the EEC position. Faced with this take-it-or-leave-it situation, Turkey called off the meeting.

Since then the concessions have been improved but difficulties remain, particularly in the field of freedom of movement for Turkish workers into the EEC.

There are also difficulties over agricultural trade. The Nine are committed to improving access for Turkish products in the light of the regime recently agreed for the Mahred States. The original Council proposal was rejected by the Turks as not worth having and have since been somewhat improved.

Greek economy 'better'

BY OUR OWN CORRESPONDENT ATHENS, Sept. 5.

ESTIMATING Greece's defecacy ability and the country's edy integration in the nmon Market are the two nary objectives of the Govern- n's present economic policy, mter Constantine Karamanlis at the Salonica trade fair the week-end.

he Premier said that despite vy defence expenditure which tripled in the past two years, rnational stagnation and its rral repercussions in Greece.

Greek economy was doing r than in most West opean countries.

ross national income is ected to exceed five per cent. 976 (compared with 3.3 per

Soviets trim Czech oil

PRAGUE, Sept. 5.

TEST crude oil deliveries to oslovakia in the next five s will fall short of original nates, a senior official said.

y Communist Party Secretary f Kempny, a member of the g Presidium, said oil lies represented "the est problem of (Czechos kia's) external relations in eld of fuel and power."

r Kempny's speech at a r day rally, as reported by official Ceteka news agency, no hint of the extent of the et cutbacks. Nor was any on given for the decision to the original plans.

st year, the Government dis- id it would buy 88m tonnes rade oil from the Soviet n over a five-year period ing this year, enough to 50 per cent. of its require- s. Under a contract signed

Peking row after quake

PEKING, September 5.

INSTERS, demons and the ng of society" surfaced ng relief efforts after the staling Tangshan earth- e, the People's Daily news- r said to-day.

te commentary, re-printed i the Red Flag Theoretical nal, was the latest in a s of highly politicised rts illustrating the heroina, military and civilian resour- ers, but suggesting a dis- had broken out over how andle the crisis after the quake.

le recent commentary said e who followed the line of purged and vilified former -Premier Teng Hsiao-Ping caused "losses" in the Reuter

S. Africa strike threat

JOHANNESBURG, Sept. 5.

MILITANT blacks were reported to-day to be planning a nation- wide strike starting on Tuesday. The strike could re-ignite riots that have claimed almost 300 lives in South Africa since June.

Riot Police Chief, General David Kriel, said police had heard of such plans and would take special precautions. To-mor- row is a public holiday. General Kriel said his men would act against strike organisers and anyone preventing people going to work.

It is two weeks since black youths in South Africa's biggest township Soweto, tried to enforce a three-day strike in protest against the Government's race policies. The strike call was first made by pamphlets which police said were the work of the banned African National Congress (ANC).

So far, there is no evidence that the ANC is behind the latest strike attempt. The call is being made by word of mouth, accord- ing to Soweto residents, and the strike is supposed to last three weeks instead of three days.

The last strike was estimated to be about 50 per cent. effective. But it triggered a vicious black backlash by Zulus and other workers, mainly contract labourers living in men-only hostels, against intimidation of commuters.

Justice Minister Mr. James Kruger, who denied allegations from Soweto leaders that his police deliberately instigated last month's Zulu backlash, is con- sidering giving legal status to tribal vigilante groups in the townships, reliable sources said to-day.



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The Technical Page

EDITED BY ARTHUR BENNETT AND TED SCHOETERS

RESEARCH

Laser writes tiny symbols on film

ALTHOUGH direct production of characters on microfilm by laser beams is not a new technology it has been demonstrated already by Data-Graphic and 3M among others. The dye transfer process perfected by IBM San Jose seems to be the simplest and easiest method of writing characters and symbols on film in sizes down to a fifth of average typewriter characters.

In the work done at San Jose, the laser beam transfers solid dyes between one sheet of plastic and another red, orange, blue and black dyes have been successfully used.

A dye-coated strip of Mylar is sandwiched with a second piece of Mylar, the dye being held in the space between the strips. If a laser beam is allowed to impinge on a spot in the coated strip, the dye immediately migrates and condenses on the second strip in a "printed" spot. Diffusion of the dye in the second film produces a permanent mark and, in contrast with conventional microfilming techniques, the method cuts out the use of expensive silver halides, as well as chemical and thermal treatments to develop the microfilm.

Applied to Computer Output to Microfilm (COM) technology, it could permit the production of microfilm record direct from a central computer rather than from a reel of magnetic tape transferred to a COM unit, intelligent or not.

The laser process is a one-step dry method and it could be used for posting and annotating in applications such as banking records and by direct methods for which existing COM operations are not really practical.

In tests of the technique, characters have been formed as dot patterns within cells five dots wide by seven high.

Volumes from ERA

TWO more informational documents have been made available by Electrical Research Association at a price of £33 each.

One of them is ERA's latest technical and commercial guide to the design and construction of electrical equipment in Europe. It is sponsored by leading European suppliers of goods and services, and contains valuable information on the selection of commercially available systems, in addition to how and when to build equipment in-house. Section one is an independent review of automatic equipment for quality assurance while section two is a comprehensive directory of products and suppliers, listing them on a country by country basis.

The other document is the proceedings of a seminar held in London in May dealing with the future of switching components. Containing 130 pages, it includes the full text of all the speakers' papers with illustrations. ERA is at Cleve Road, Leatherhead, Surrey, KT22 7SA (03723 74151).

COMPUTERS

Alternative source of memories

ADDED to the range of MOS 18 memories for 1800 computers by Systems Reliability is a memory system for the 1803T computer. This means that Systems Reliability now manufactures plug-compatible memories for the small, medium and large 1800's.

The memory can be used with all the various upgrades of the 1803T and users are being given the choice of either purchasing or leasing these MOS memory systems.

Systems Reliability has been designing and manufacturing memory for over five years now and has installed in excess of 70 32k word systems.

More from the company at Rilton Way, Dallow Road, Luton, Beds, LU1 1UU. Luton (0552) 38581.

COMPONENTS

Switch is explosion proof

APPROVED by the U.K. (BASEEFA), German (PTB) and Danish (DEMKO) testing authorities is an explosion-proof pressure switch put on the market by Luba (Industrial Products), P.O. Box 7, London E6 2JP (01-471 8121).

Known as the SOR/BETA series 4000, the switch has an alloy housing with three separate compartments to ensure complete isolation of the electrical elements from the pressure sensing element which comes into contact with the fluid medium. The compartment con-

taining the pressure switch terminals can only be opened with a special tool, preventing access by unauthorised personnel.

The second compartment houses a microswitch, which is provided with ratings up to 15A 450V. It is connected to the main terminals through sealed bushings. In the last compartment is the pressure set-point adjustment nut and passing through it is the actuating rod which goes on into the microswitch compartment.

The adjustment compartment is vented to atmosphere, it being possible to provide the vent with tubing connections to dispose of dangerous fluids in the event of a sensing element failure. Pressure ratings up to 525 bars are available.

INSTRUMENTS

Portable pH meter

THE MODEL P101 instrument introduced by Channel Electronics is designed for the rapid determination of pH values and millivolt levels on site or in the laboratory.

Dimensions in the carrying case are 139 x 131 x 70 mm, the weight is 0.78 kg and operation is from a pair of 9V (PTP or similar) batteries. The instrument offers manual temperature compensation over the range 0 to 100 deg.C and has a 0 to 14 pH scale and 400-0-400 mV scaling. There is also a chart recorder output socket.

The complete package consists of the measuring instrument, a robust combination electrode with removable sample cup, various buffer powders in sachet form, and case with accessories pockets. A test band meter is provided for ruggedness and the combination electrode is plastic protected for long life.

More from the company at Cradle Hill Industrial Estate, Seaford, Sussex (0323 894611).

TEXTILES

Rebirth of warp knit fabrics

JUST A few years ago almost all the shirts made in Britain were built from a harsh, harsh-handling warp knitted nylon. The death knell of this garment was sounded when the polyester/cotton blend shirting appeared. This had all the easy-care properties of the nylon and was accompanied by a much kinder handle as well as being far more moisture absorbent.

The decline of the nylon shirt came as a time when warp knitted fabrics entered a serious period of fall in demand and throughout the world warp to develop another textile market share falling and as a result some have gone out of existence.

Now, a British process could perhaps reverse this trend and see a revival in the use of warp knit clothes in a far wider range of applications than ever before.

It is, of course, theoretically possible to warp knit textured yarns but the cost of raw materials and the critical nature of such an approach is such that it is economically not very appealing. The new British approach is to "bulk" and texture the fabric after it has been produced.

Supatex is the name of the technique evolved by Hunt & Moser (P.O. Box 8, Middleton, Manchester M24 1QT. Tel: 061-643 8278) and it can be applied to many cloths. In addition to warp knits, and also to virtually any type of natural or man-made fibre. In simple terms the cloth is held against a roller by a very heavy rubber blanket which enters on the first point of contact at one speed and leaves it at an appreciably lower one.

The process is very substantial and a great deal of power is used to compress it so that the top roller against which the blanket is pressed and, with the rubber blanket sandwiched between, runs at one speed, while a second roller that supports the blanket in a position between two other rollers, runs at a speed that is a predetermined percentage less than the rest of the assembly.

This forces the fabric to compact against itself and so be given built in crimp and texture.

The degree of compaction is normally somewhat less than the percentage "retard" of the whole system. Thus a retard of say 35 per cent may well compact the fabric by say 30 per cent, this being a high level of compaction. Normally 10-20 per cent will be sufficient for most cloths.

It has been suggested that Supatex is a method of making a "silk" out of a cow's ear. This is in part true for there is no question that the finished cloth is infinitely superior in the qualities sought to that fed into the machine. What is not true is that interest to the trade is that it offers a manufacturer an opportunity to weave or knit a very open structure and then upgrade it in terms of density, opacity, etc. while at the same time being able to weave or knit higher yardages in the plant without the need for more machinery.

The "silk" was originally conceived in terms of making stretch fabrics. A weft of stretch yarn may be used with a flat warp and then treated to give a two-way stretch. The process is a difficulty linked with weaving stretch or textured yarn cloths as opposed to the textured warp and with Supatex this can now be replaced by the much easier to weave flat yarns.

Considerable interest in this new concept has been expressed throughout the trade and shortly the first commercial machine will be installed in Courtauld's Knitting subsidiary Furzebrook Knitting Co., Spendon.

In view of the fact that Courtauld is involved in so many sections of both weaving and knitting, doubtless the machine will be commercially evaluated on a diversity of cloth constructions, as well as fibres and fibre blends.

THE AWARDED WINNING NORGREEN OLYMPIAN PLUG-IN-SYSTEM

Design Council Award 1974
COMPRESSED AIR PROCESSING EQUIPMENT

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OFFICE EQUIPMENT

Copies from microfiche

A MINIATURE microfiche duplicator made by Addressograph-Multigraph can make up to 300 diazo copies an hour. It is no bigger than a typewriter, plugs into a standard convenient electric socket, and so can be used on any handy desk-top.

OP-10 is easy to operate and needs no special skills. The fiche to be copied is placed together with a diazo sensitized sheet in the exposure section where illumination is automatically controlled. Diazo film is then separated from original fiche and inserted in the developer slot. In the few seconds the first takes to develop, the second can be prepared in the exposure section.

AM OP-10 can, in an emergency, be used to make vesicular (reversal) duplicates, too. Double exposure is necessary to clear the thermal-active film properly, at the rate of one per second and vectors up to the full diagonal (454 mm) of the plotter bed may be drawn in one move.

Sintrom operates from 2, Arkwright Road, Reading, Berks. Reading (0734) 85494.

HEATING

Fuel saving in hot air processes

IN A NUMBER of different industries, continuous ovens of various kinds are used. The circulation of hot air inside such ovens often results in substantial—and expensive—thermal losses as the air is extracted from the oven taken through a heat exchanger before being discharged into the atmosphere.

In the textile industry, which is increasingly dependent on high temperature, say 150 to 200 deg.C, another oven exists—synthetic fibres have to be heat-set to stabilise them, but in production processes, various oils and other dressings are applied to improve processing conditions. These vapourise in the ovens and it is common to have a steam jacket which draws off these oils fall after the having condensed from the spent exhaust hot air.

An American company, Marshall and Williams Co. (British agents: Samuel Bradley Machinery Sales), 21c, The Precinct, Chester, Flintshire, SK3 5BB (061-455 8438), has introduced a combined incinerator/heat recuperator which, it is guaranteed, will save at least 50 per cent of fuel used for a particular task. It is a development that can be fitted to existing stenter frames. Not only does it offer substantial savings in fuel, but the final exhaust from the system is non-polluting and in no way noxious.

The concept is simple. A HEARING material Union, although the technology is Type "A" R.R. developed for use in highly sophisticated. Exhaust from the chamber of a heat setting stenter may well contain water, air, fibre particles, monomers and vaporised lubricants of various kinds. All can be burned. As this exhaust is extracted from the chamber, it is purged in spherical bearings looped through ducting to a gas burner. Under an agreement with Marshall and Williams, the temperature range extends from -55 degrees F (-54 degrees C) to +235 degrees F (+113 degrees C) and the burner varies from 600 to 1,000 deg. C, depending upon conditions. After several passes room temperature.

HEATING

Fuel saving in hot air processes

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MATERIALS

Extremes of temperature resisted

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CONTRACTS AND TENDERS

FEDERAL REPUBLIC OF NIGERIA
NATIONAL ELECTRIC POWER AUTHORITY
PREQUALIFICATION OF TENDERERS FOR
CONTRACT NO. CS006
GENERAL WORKS
FOR
SHIROHO HYDROELECTRIC PROJECT
NIGER STATE, NIGERIA

The Shiroho Hydroelectric Project is located in Niger State, Nigeria, approximately 90 km southwest of the city of Kaduna. It is situated at Shiroho Gorge on the Kaduna River, which flows into the Daura River. The National Electric Power Authority (NEPA) plans to invite tenders from prequalified tenderers in March of 1977 for construction of the project. The project consists of a dam with a height of 70 m, including spillway, an above ground indoor-type powerhouse with a generating capacity of 600 MW consisting of four units.

A power intake structure and four 3-metre diameter concrete enclosed steel penstocks averaging 340 metres in length.

An administration and control building.

An estimated average of 1000 MW of power.

Turbines and governors, generators and accessories, and power transformers will be furnished and installed under other contract. NEPA will provide civil works, including site preparation, access roads, and infrastructure for installation under the General Works contract. The work of the contract for the General Works includes the following principal items:

Construction camp, storage warehouse and area, offices, first aid stations, and similar temporary works.

9 km of service road.

River diversion works consisting of two 13-metre horseshoe shaped tunnels 430 metres long and necessary cofferdams.

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Building and Civil Engineering

Good start for George Wimpey

A £31m. contract awarded by the Tame Division of the Severn Trent Water Authority and another worth £18m. awarded by Nottingham Corporation, bringing the total to well over £50m., makes a good September start for George Wimpey.

The larger contract is a central services depot at Park Farm, Minworth, Sutton Coldfield, West Midlands.

Included in the 9,625 square metres development is a workshop and stores building of 7,000 square metres at ground level and 630 square metres at first floor, constructed in steel frame with metal cladding. Other structures include a 215 square metres two-storey boiler house and an 80 square metres single-storey substation and compressor building, a gate house and a two-storey office block/link section.

This contract, for which the architects are Peter King and Jones, is due for completion in June, 1978.

The Nottingham job, at Clifton Lane, is for 220 dwellings and is the second phase of the project now under way there.

The original contract was awarded to Wimpey in September last year and the two together will bring the total number of homes to 600.

Allows for curves in pipework

FLEXIBILITY of Victaulic mechanical pipe joints, made by the Victaulic Company (part of the British Steel Corporation's Tubes Division), of Hitchin, Herts, is the main reason for their selection for use on long runs of sprinkler feeder pipework required for installation around the big new crescent-shaped Transfesa International Freight Terminal at Padstock, Woking, Kent.

A bonded transit shed with its own freight link, the 300,000 square-foot Transfesa building is a quarter of a mile long and 220 feet wide, being built in a curve of 240 metres radius to provide maximum floor area in the available acreage. A total of some 470 Victaulic joints, and mainly of 4 inches diameter, were required in the sprinkler system designed and installed by Ellis Fire Protection of London.

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The Executive's and Office World

EDITED BY JOHN ELLIOTT

Businessmen are major users of Concorde. Michael Donne and Nicholas Leslie look at how they and their companies rate its value in terms of prestige and speed.

Balancing a supersonic cost

CONCORDE HAS now been in service on the London-Bahrain route since January 21, and on the London-Washington route since May 24. Although utilisation is still very low, this is sufficient time for British Airways to be convinced that the aircraft can justify its existence by making money on direct operating account although not yet yielding profits on the total investment of \$150m. Involved in buying five aircraft, so far only two have been delivered and BA has spent over \$75m.

The load factors (the number of seats sold) on the North Atlantic run are excellent. From Washington to London, the average load factor is 90.2 per cent, but westbound to Washington it is 93.2 per cent. On the route eastbound to Bahrain, the load factor is only 34.8 per cent, but is much better at 63.6 per cent westbound to London. By early August BA had carried 3,791 passengers on the Bahrain run, and 2,282 on the Washington route.

Some preliminary market research carried out by BA indicates that most of these passengers are businessmen, with a wide mix of nationalities, but perhaps a preponderance towards Americans. On the Washington route and Arabs on the Bahrain run. Some facts, however, are significant. On the Bahrain route, about 20 per cent of the passengers come from Australasia, this indicating that people want to fly subsonically as far as Bahrain, and then finish their journey supersonically. Abu Dhabi appears to be the most popular onward destination from Bahrain, however, while Doha also figures strongly in the list.

On the Washington route, New York is still the biggest single originating centre for traffic, accounting for some 17.4 per cent. But overall, on the North Atlantic run some 90 per cent of the total Concorde traffic in both directions is making connecting flights at one or other end, while some 30 per cent connect at both ends, and use the Concorde sector as a speedy middle link in the journey chain.

One odd fact is that 28 per cent of BA's Washington to London passengers go on to Paris, notwithstanding the existence of Air France's own direct Washington-Paris Concorde service.

Three reasons

The BA studies have not yet gone as far as identifying each of the passengers sufficiently to categorise them by occupation, home-town, reason for travel and so on. But enough information has been obtained to indicate that most of Concorde's customers travel for one or more of three main reasons. First, because Concorde is something new: it is there, and is a prestige aircraft in which to fly. Second, because it gets the passenger to his destination much more rapidly—in 3 hours 50 minutes as against seven to eight hours in a subsonic Jumbo jet on the Atlantic—so that he feels fitter and fresher. Third, so far as U.S.



Travellers check in at the Heathrow Concorde desk.

passengers are concerned, the exchange rate in the dollar's favour, so that the ride, at least westbound to the U.S., is one of the biggest travel bargains on the North Atlantic. Companies in London asked by The Financial Times about their policies on Concorde flying show however that few major U.K. companies seem to use Concorde regularly or to operate a policy about when to use it, and when. The most common factor seems to be that travel on Concorde would have to be justified in economic terms while the prestige factor is accorded a very low priority.

Company policy

Barclays Bank International says that any personnel flying Concorde—and none have yet—would have to justify the trip in terms of the importance of the business in hand, and savings in executive time and finance. The Beecham Group similarly has no specific policy, although any use of Concorde would be likely to be limited to very senior directors or executives.

Other companies with similar views include Grand Metropolitan, Royal Insurance Group and EMI, and most agree with the views put forward by Barclays. Many companies, including BOC International, Plessey and Richard Costain, make the point that economic justification is important, indicating that but of the U.K. at any rate, the 20 per cent surcharge is of considerable significance. BOC says its directors may fly Concorde as a normal part of first class travel while at Plessey the urgency of the job involved would be the main criteria.

Each of the three main factors identified by British Airways is worth analysing in turn. First, prestige: Concorde is a big talking point among the U.S. business cocktail and lunch circuit. To be able to say one has flown Concorde is something which, like reading the National Geographic, "identifies" you.

This is perhaps the least significant factor of the lot, and BA does not expect the novelty value to last for long. While it is a good advertising point it is not believed to generate substantial business on its own account. Secondly, the Concorde's Atlantic schedules are so

designed as to make it as easy as possible for a businessman to arrive in Washington (at 12.05 on Thursdays and Saturdays) and to leave (at 12.30 on Fridays and Sundays) in time for connecting flights. So far as arriving in London is concerned, at 21.35 the passenger from Washington gets one of the shortest possible days, and can get to bed at a reasonable hour, whether he is planning to work or travel on the next day. It is this ease of connection to other destinations that probably accounts for the bulk of the high load factors on the BA Washington route.

Although there has been some criticism that one of the flights arrives in Washington on a Saturday lunchtime, and one in London on a Friday night, it does not appear from the load factors (and the heavy forward bookings) to be a disadvantage from a businessman's point of view, while from this autumn another frequency will be added—outwards to Washington on Tuesdays, and inbound to London on Wednesdays.

Fatigue

BA makes a particular point of stressing the ease of making connections, especially since it helps to cut down the total travelling time. It must play a part in combating fatigue. "Jet Lag" or "Time Zone Fatigue" is a subjective phenomenon. Everybody suffers from it, but some much more than others. It is an arguable point whether crossing time zones faster enhances fatigue because the body's rhythms are required to readjust that much more quickly. But having travelled on Concorde several times I know that one does arrive at one's destination fresher and fitter than on a subsonic Jumbo, and for that reason I prefer to travel Concorde.

The third factor—fares—throws up an intriguing situation in that it is possible at present to fly Concorde from London to Washington at less cost than for a first-class subsonic Jumbo ride from Washington to London, notwithstanding the surcharge on Concorde of 20 per cent of the normal first-class fare.

This anomaly stems from the current depreciation of sterling against the dollar, and from the fact that the airlines' machinery for meeting these problems through a system of currency

good load factors from London to Washington on Concorde.

But a survey of actual and potential Concorde travellers still appears to indicate that it is New York that will be the most important market for their aeroplane on the North Atlantic run for a variety of reasons. The first, inevitably, is that New York is the business capital of the U.S. and generates more North Atlantic traffic than any other U.S. centre. It has more connecting flights with other parts of the U.S. than Washington, so its passenger catchment area is larger. Moreover, most of those flights go direct to and from Kennedy Airport, whereas in Washington many connections start or end at National Airport.

From the British viewpoint, however, many of these factors do not seem to apply.

This does not necessarily indicate that U.K. companies are among the backwoodsmen so far as promoting the use of advanced technology is concerned. In fact, many of them are in the advanced technology business themselves. More to the point, it indicates that so far the Concorde network is too restricted to be of any major benefit. But when it has been considerably expanded—say to New York and other U.S. cities, and to Singapore and Melbourne and Tokyo, a totally new situation will emerge. Even so, however, enough information is emerging to indicate that Concorde is beginning to make its way in the air transport world.

EXECUTIVE HEALTH

Pills and jabs

BY DR. DAVID CARRICK

ALTHOUGH financial stringencies have reduced the number who can holiday abroad, some people are still able to afford the luxury of language difficulties and alien habits. Business executives especially seem to be able to travel all over the world so long as such peregrinations promise profits.

The latter group, in my experience, is far less meticulous when it comes to rules concerning health before, during and after foreign forays than the holidaymakers. This is probably because wives, who rarely accompany their men on business but usually do on holiday, are far more conscientious and meticulous where health is concerned than are their counterparts, so that immunisations (when needed) are requested in ample time.

Many businessmen, either through their own thoughtlessness, or that of their seniors, at any time and everybody should be protected by the nicest medicine ever—three drops of vaccine on a sugar lump—to avoid a life-time of crippledom.

Immunisation against tetanus is a wise precaution as the wretched causal organism can be found almost anywhere and is a potent slayer. Much more vaccination against smallpox is localised, but very unpleasant and sometimes fatal, are the several varieties of malaria. Anti-malarial tablets have to be taken two weeks prior to going to danger areas and continued, during the stay and for four weeks after returning home. These injections have to be repeated every six months. Any pill-hater who believes he can outwit mosquitoes is a fool required for much of South America and central Africa.



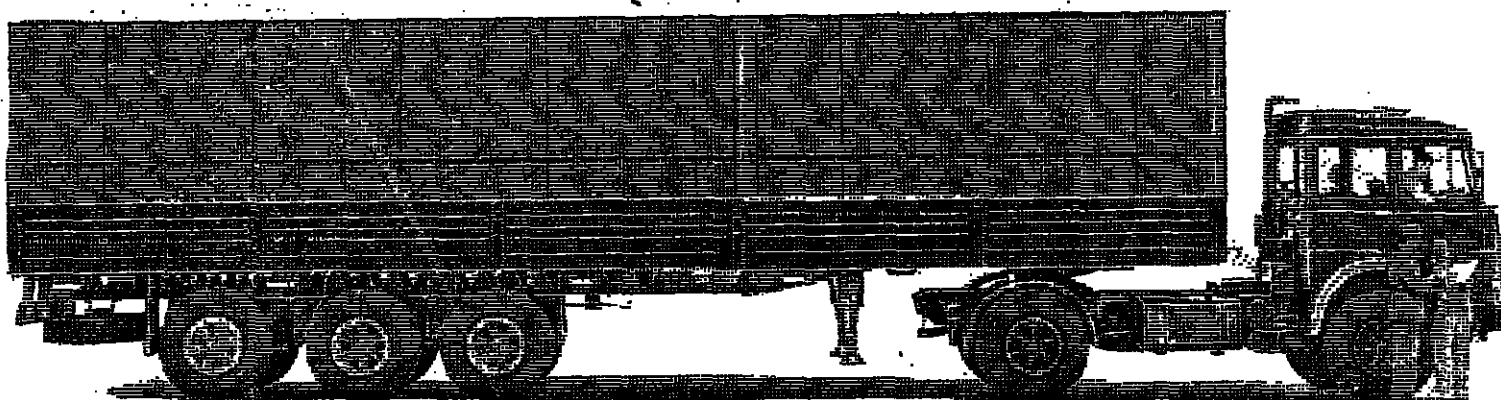
It lasts ten years. It should be remembered that a lapse of at least seven days must be allowed between immunisations against yellow fever and smallpox.

Visitors to the Mediterranean coastal areas are well advised to be immunised against typhoid. Poliomyelitis, although rare these days, can reappear at any time and everybody should be protected by the nicest medicine ever—three drops of vaccine on a sugar lump—to avoid a life-time of crippledom.

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I have left to last one of the commonest scourges of travellers—bowel upsets, known colloquially as "Gippy Tummy," "Delhi Belly," "Roman Runs," "Tokyo Trots," etc., which can wreck a holiday or render a business trip a colicky catastrophe. The cause is unknown but probably the visitor encounters organisms to which the natives are immune. The drug, Streptotriad (on prescription only), taken when the disorder begins and for three days after it stops, is extremely effective and can make the difference between a sad holiday and a happy one, or successful business instead of profitless perambulations.

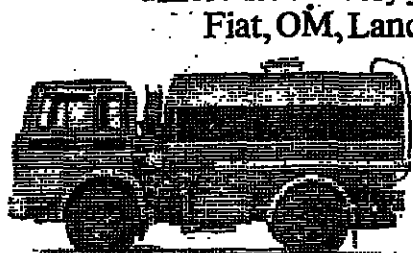
It may be noted that I have not mentioned rabies, plague, Lassa fever, or strange diseases confined to American jungles. Equally I have ignored volcanic eruptions, earthquakes, hurricanes and tidal waves as, happily, the average holiday-maker or business traveller is unlikely to be troubled greatly by any of these, unless he is extremely unlucky or very foolhardy.



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MOVING JOBS

BY SUE CAMERON

The family life of 'gypsies'

MANAGERS AND their wives are not properly consulted by companies over moves to new jobs in different parts of the country according to a study of "executive gypsies" carried out by the Institute of Science and Technology at Manchester University.

The study, written by Judi Marshall and Cary Cooper, appears in the latest edition of Management Decision. It shows that many companies move their executives without considering the disruptive effect on family life without taking wives' views into account, and without being honest about promotion prospects.

Interviews with 40 managers and their wives indicated that the stresses and strains of moving are far greater at certain points in an executive's career than at others. The study says that when a company is planning to move a man it should consider "individual and family circumstances—house moves, schooling, wife's career plans—with a view to integrating them into the changes and demands of work." Wives should also be consulted.

they should have the right to take time off to find a house. Arrangements should be made for wives to meet other company wives in their new towns and families should be provided with as much information as possible about their destination.

In addition to this managers should be given honest and up to date information about their career prospects so they can work out all the consequences of a suggested move. The worst possible time for a man to take up promotion in a new area was found to be when he is married with young, school age children. At this stage of development wives are tied down with family responsibilities and find it harder to make new friends and house buying becomes more difficult because of the need to be near a good school.

Some managers who took part in the study had tried to solve these problems by leaving their families in their old homes while they themselves commuted back and forth at week-ends. But this often had serious consequences for the children and sometimes led to an intolerable strain on the marriage.

Young children often started worrying that their fathers would desert them altogether. And the men became tired of having to travel long distances while settling into a new job and house hunting. The study showed that one of the biggest complaints of executives who had to move around in their jobs was the lack of information they were given. Often managers were told they

would be staying in a certain place for a number of years and their companies then decided to move them again in a very short space of time. Many organisations also failed to tell people of the effect a move might have on their chances of future promotion.

Reluctance

It was found that some men had moved—with great reluctance—because "they believed this was the only way to further their careers. They then found themselves stuck on the promotion ladder and in addition they were living in a town they disliked. Others who had turned down a move found there were no adverse effects on their careers although one manager who took part in the study said his career "went downhill" when he refused to move even though he had been assured this would not happen.

Younger wives resented being treated as "chattels" and many of those interviewed felt that companies did not consider their feelings enough. "Examples it put an intolerable strain on when the wife is pregnant, wives having to move their families abroad without the husband's help and not having adequate opportunities to see the new location beforehand were quoted."

The Mobile Manager and His Wife. By Judi Marshall and Cary L. Cooper. Management Decision, Volume 4, Number 4, 300 Repley Road, Bradford, West Yorkshire BD9 4JZ. Often managers were told they

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MONDAY, SEPTEMBER 6, 1976

How costs get pushed up

THE SHORT-TERM forecasting of inflation is now a flourishing art—a fairly straightforward matter of deriving forecasts of future prices from current movements in wages, material prices and other costs: but such exercises have little or no explanatory power.

The monetary thesis is so fashionable that it is astonishing that no proper model appears to have been devised to test it against British experience, but in any case its most fashionable version, as put forward by Sir Keith Joseph, seems to suggest that monetary excess is the result of the failure of successive governments to resist trade union excess, and to allow over-ambitious wage claims to reap their natural reward in terms of rising unemployment. If this is the truth, then wage push is the prime cause: but the tremendous acceleration of wage claims in recent years—and not only in this country—would remain to be explained.

Traumatic events

One must be grateful, then, for the efforts of three economists who reported last week, in the Review of the National Institute of Economic and Social Research, the result of their efforts to test the main ruling theories against up-to-date experience, including the traumatic events of 1974. While their review can hardly be described as a comprehensive survey, since only four basic theories were tested in a fairly simple form, their results are highly suggestive.

First, they claim that the so-called Phillips curve relationship, which suggests that the main cause of inflation—or at any rate of wage increases—is excessive demand for labour, so that a high level of unemployment will check it, is not supported by British experience at any period since the war. In recent years, it seems to have turned upside down, so that at times of rising unemployment (and correspondingly slow progress in output, earnings and productivity) wage and price increases tend if anything to accelerate.

However, the theory that growing trade union militancy or monopoly is responsible for the worsening trend—a theory which would associate acceleration

On the way

This is the truth which seems at length to have dawned on Mr. Healey, who has been warning his supporters that the public will no longer pay for larger spending programmes. If he can progress further, and convince Labour that the best way in which it can serve the interests of its supporters is to make it possible to reduce taxes on wages, we will at last be on the road to conquering inflation.

Direct investment in the U.S. from overseas has boomed in the last three years. Stewart Fleming reports

The investment tide flows back

THE tide of foreign indirect investment from the U.S. which swept around the world in the 1950s and 1960s is abating. It is being replaced by a surge of foreign investment by overseas corporations into the U.S.

Last year, according to Commerce Department statistics, direct foreign investment by the U.S. rose only 12.1 per cent. to around \$133bn. and a study this year by the economics department of McGraw-Hill Publications suggests that growth this year will only be moderate too.

In contrast, foreign direct investment in the U.S. suddenly accelerated in the past three years. In the decade up to 1973, growth of foreign direct investment in the U.S. averaged around 6 per cent. a year. Since then it has been averaging nearer 20 per cent., and even in 1975, when most observers detected a slowdown probably reflecting the impact of the recession abroad, foreign investment still grew by just under 20 per cent., about \$4.3bn.

Most observers believe that this rate of growth is continuing, if not accelerating this year, although it will be some time before the most authoritative figures will be available.

It is not necessary to rely entirely on subjective assessments of what may now be happening. The U.S. Conference Board, an influential research organisation with strong ties with business, recently reported that in the first half of this year, in dollar terms, announcements of foreign direct investment plans in the U.S. are running 60 per cent. ahead of last year at some \$900m.

This figure excludes the estimated \$250m. which Volkswagen of West Germany is planning to invest over the next couple of years in its first U.S. manufacturing plant to build the Rabbit (known in Europe as the Golf). This decision is in itself a significant pointer as an example of a company with a strong export base in the U.S. (through the Beetle, whose sales have been declining) deciding on the creation of a manufacturing plant.

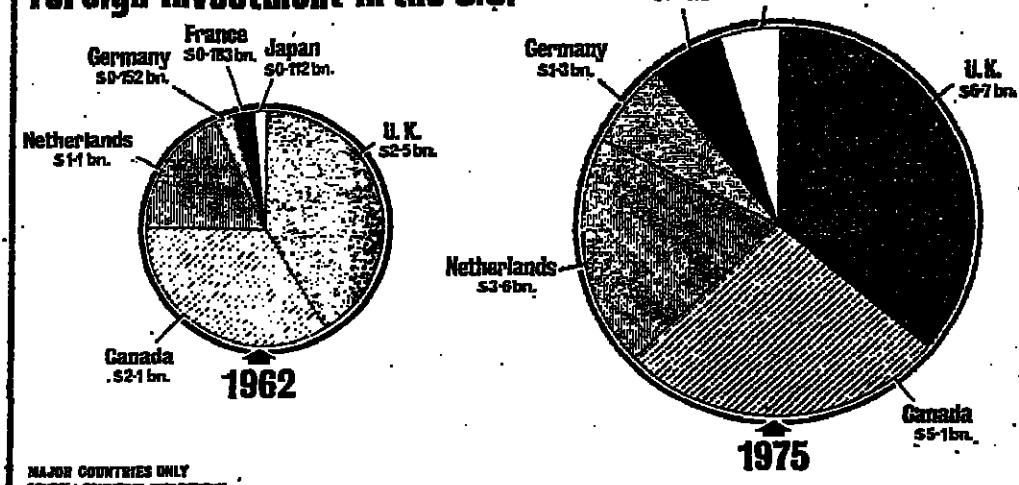
The conviction that increasing foreign investment in the U.S. is not a transitory development is already leading some banking organisations to prepare for what they hope will be a profitable new line of business.

In the 1950s and 1960s many of the biggest U.S. commercial banks such as Citibank were opening foreign branches to service the U.S. corporations overseas. Now it seems these branches are being used to facilitate the reverse movement.

Citibank has recently set up what it calls its international marketing unit under a vice-president, Mr. John Rose, which is seeking out European companies which are looking to expand in the U.S. perhaps through acquisition.

The investment banks too are actively canvassing in Europe for customers who want a U.S. base, and in the U.S. they are

Foreign investment in the U.S.



seeking out acquisition targets. As one banker pointed out, the Securities and Exchange Commission disclosure requirements, because they are so demanding, are a great help to foreign companies looking for a U.S. acquisition.

Mr. Rose, of Citibank, makes the point that by and large the new market opening up is not only among the biggest multinational corporations outside the U.S. In many cases these already have either well-established operations here or commercial and financial ties. Companies such as the Shell Group, British American Tobacco, Brown and Wilkinson Industries, Nestlé, British Petroleum and Hoffman-La Roche have well established U.S. corporations, in some cases ranking high up the Fortune list of 500 largest industrial corporations. Rather the target is the overseas company with perhaps sales in the \$250m. to \$500m. range for which expansion in the U.S. might be its first excursion into multinational business.

Proportion of earnings

The above diagrams give a breakdown of foreign direct investment in the U.S. for some main categories, but the overall figures are just as indicative of the trend.

Thus in 1962 Commerce Department statistics indicate that total foreign direct investment in the U.S. was \$7.6bn. The figures are based on the nominal value of equity investment plus net loans and re-invested income and include companies with a 25 per cent. or over foreign shareholding.

By 1972 it had increased to nearer \$15bn. A substantial proportion of this increase, perhaps as much as a third, came from retained earnings. By the end of 1975, the figure had come close to doubling again reaching \$27bn., and total assets of these companies (a large proportion in insurance and banking) was around \$174bn. at the end of 1974. Analysts believe that if any-

thing the Commerce Department statistics are conservative. The Department itself is currently revising them to include shareholders of 10 per cent. and over which will give the total a further boost.

So far this year there has been plenty of evidence of the growing interest in the U.S. from European companies in particular. Hawker Siddeley, the British aviation group, has bought a 30 per cent. stake in Onan Corporation for \$37m. When Babcock and Wilcox found itself with \$70m. to spare from the sale of its German interests to the Shah of Persia, it decided to buy the American Chain and Cable. Imperial Chemical Industries, too, has set a policy of rapid expansion in the U.S. Rather like Babcock it felt it was underrepresented in the U.S. in relation to its size (and its European competitors like Hoechst and BASF which are well established here). Thus it has interests in offshore exploration consortia in the Gulf of Mexico, has a 15 per cent. stake in a Chevron-led consortium which has just won five licences in the Atlantic lease sale and is expected shortly to announce important new plant programmes in the south of the U.S.

Only this month St. Gobain-Pont-a-Mousson, the French concern has said it intends to spend in the region of \$22m. to buy the 10 per cent. of Certain-Teed, the Midwest building products group, which would give it over 50 per cent. of the equity. Recently, too, the French state oil company Elf-Aquitaine tried and failed to get control of a U.S. chemical company, Ventron. It lost out to a rival U.S. bidder, Thiokol, brought in by Ventron as a defensive manoeuvre. Landis and Gyr, the Swiss electrical engineers, have announced an offer through White Weld for Duncan Electric, the fourth largest U.S. electric meter producer. Again, a rival U.S. bid from Midland-Ross Industries could be just around the corner.

GEC, one of Britain's largest industrial groups, expects to finalise an agreement to buy

from White Motor Corporation a subsidiary company which manufactures diesel engines for industrial use. This will give GEC its first manufacturing base in the U.S.

These are some of the main examples which can be easily picked up from announcements because they involve public companies. But most investment bankers on Wall Street agree that the wave of immigrant corporations is much stronger than these few examples would indicate, especially among smaller family concerns which deliberately shun publicity and in some cases are keeping their investments below a publically reportable level.

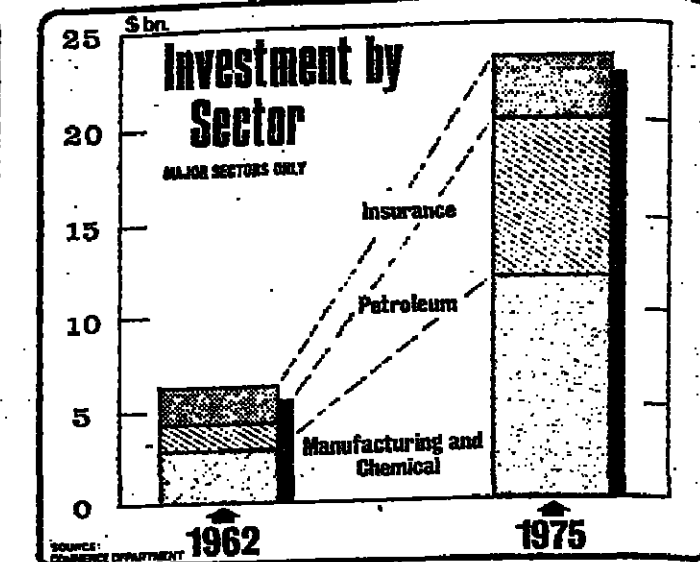
It is one thing to describe what is happening, but another to explain it, and in particular to explain the acceleration in recent years in the growth of foreign investment.

The most comprehensive analysis of the subject (running to nine volumes) was recently published by the U.S. Commerce Department, following a study the U.S. market. Most analyses suggest that U.S. labour costs are, per unit of production, no longer significantly higher than those of Europe and Japan, and that labour costs, once a barrier to U.S. operations, are no longer perceived to be one.

As for the activity in U.S. acquisition by foreigners over the past few months, what are held out to be historically low stock market values for U.S. industry are selected as being an important influence.

But perhaps the most controversial, and most widely cited explanation of the wave of foreign immigrant corporations, is political uncertainty in Europe. It is difficult to determine how influential this is because of the natural prejudice of many American bankers for example, against what they see as socialist (rather than social-democratic) trends in Europe.

Many U.S. bankers however stress that their clients, particularly where the company is family controlled have decided to seek expansion in the U.S. partly because they are unhappy about political trends in Europe, or perhaps the



influence of labour unions (Swiss companies of course have another motive, namely the growing difficulty of exporting as their exchange rate appreciates.)

It points, too, at the improving technological capability of these companies, particularly the Japanese. And then there is the two-way flow of technology with some companies coming to the U.S. to exploit their own superior technology and others coming in search of it.

Devaluation of the dollar

Another basic factor which the Commerce Department mentions which bankers place great emphasis upon has been the trend in international exchange rates and labour costs. Thus the devaluation of the dollar in relation to most European currencies since 1971 on the one hand, and the rapid escalation of wage

costs in the remaining advanced countries on the other hand made it more attractive to enter the U.S. market. Most analyses suggest that U.S. labour costs are, per unit of production, no longer significantly higher than those of Europe and Japan, and that labour costs, once a barrier to U.S. operations, are no longer perceived to be one.

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Whatever the importance of these factors, many immigrant companies are locating their plants as Michelin, the French tyre manufacturer has done, in areas such as South Carolina where much of the labour is non-unionised (and generally cheaper).

By most standards foreign investment in the U.S. is still small and U.S. investment abroad is probably four times as great. According to the Commerce Department payments to foreign affiliates account for under 2 per cent. of non-farm private wages and salaries as up to 3 per cent. of the gross private non-residential investment.

Its greatest significance perhaps is that it is growing much faster than U.S. investment overall, and that it is concentrated quite noticeably in certain business sectors. Thus it can be of national significance that a senior executive of Unifroy, one of the companies affected by the recent 10 week rubber strike, claimed that the management was resisting the union's demands so strongly because it feared competition from foreign non-unionised tyre manufacturers.

There does not, however seem to be the national, public or political concern about foreign corporate immigrants that was apparent when Arab business interests were feared. Some foreign companies wanting to open up in business here through acquisition are, nevertheless, running into quite significant opposition. This in itself reflects a growing movement of some states to help companies and help them resist unwelcome takeovers whether by corporations or foreigners. (Some states have special laws relating to foreigners.) There is no doubt either that companies threatened by foreign takeovers are ready to appeal to chauvinism as a defence.

Getting back in step in Ireland

IF THE terrorists who plague Ireland, both North and South, are ever to be defeated, then a first requisite is that the British and Irish governments must work together. Over the past few years a closer understanding of the need for co-operation at this level has been developed, but last week the evolving harmony was rudely disturbed when the European Commission on Human Rights published a report that partly upheld the Irish Government's complaints that torture or "inhuman treatment" was inflicted on some prisoners in Northern Ireland five years ago.

Old charge

The irritation of the British side at this resurrection of what is now an old charge was not hidden by Whitehall: as a result there has been a distinct cooling of relations between London and Dublin. The charge may not be lasting, but in Ireland such setbacks cannot easily be afforded, even if they are temporary. This is particularly so when possibly more fundamental differences of approach of the British and Irish governments are beginning to become apparent. Ironically, these differences seem to place the Dublin Government nearer to a hard line on terrorism, with Britain adopting the more cautious approach.

The Irish Government's new anti-IRA legislation, introduced at a time when peace rallies in Dublin and elsewhere have demonstrated the growing public antipathy towards terrorism, increase the legal weaponry available for use by a "law and order" administration. This demand that part of that re-appraisal of the British national state of emergency, approach: this is of greater importance than the personality of the new Minister. Most importantly of all, if the new approach is to be a decision to carry on as always this is likely to be a tricky matter of not upsetting the sensibilities of what can be a hick electorate.

U.K. approach

This must be an unknown, and it does not seem likely that it will be tested while Mr. Rees himself appears to be in waiting for a new post in the forthcoming Cabinet reshuffle. Yet the interests of Northern Ireland demand that part of that re-appraisal of the British national state of emergency, approach: this is of greater importance than the personality of the new Minister. Most importantly of all, if the new approach is to be a decision to carry on as always this is likely to be a tricky matter of not upsetting the sensibilities of what can be a hick electorate.

MEN AND MATTERS

Much more about economists

A couple of weeks ago I was moved to write about the complexities of the system relating to economists employed by the Government, and also to the proliferation in their numbers. (Remember? In 1961 there were around a dozen under Sir Alec Cairncross while now Whitehall can boast 400—plus those at the Bank of England.)

This prompted a colleague to point out that there is no monopoly on economists: stock brokers too are getting in on the action to challenge official academic and banking sources in the forecasting field. How much good it really does for clients is a matter for conjecture, but it can be extremely good for the firms concerned: namely, the free publicity that Phillips and Drew derive from regular radio appearances from their economist Paul Nield, and others either get publicity through different means (the Data Stream computer gave Hoare and Co. Govett a good run before it was hived off), or are striving to catch up.

In France there is an interesting contrast. Professor Raymond Barre, already established as a leading economist, was surprisingly appointed Prime Minister less than a fortnight ago and President Giscard d'Estaing at that time described him as France's greatest living economist.

Since then, as far as Barre is concerned, it has been a case of the job promoting the economist rather than vice-versa. Since his *Economie Politique* was first published in 1936 it has now sold more than 150,000 copies through ten editions, and its author is reckoned to have picked up something like a

quarter of a million pounds in royalties. (Commonly known as "Le Barre", the book is regarded as the Gallic equivalent of Samuelson's *Economics*.)

Now there is every prospect of a great deal more to come. Barre's sudden and unexpected elevation into a top political job has produced an avalanche of new orders—not just from economic students "according to on Left Bank bookshelves."

It is not unreasonable to assume that some of the extra customers are politicians and unionists anxious to get some clue as to their inscrutable Prime Minister's inner thinking: after all there is that famous but mysterious anti-inflationary "austerity" package awaiting France in a week or so from now.

All of which will be encouraging for another aspiring author, President Giscard d'Estaing himself, whose 150-page book setting out his grand design of an "advanced liberal society" comes out at the end of September. The President is understood to have promised the proceeds to a deserving cause. But a small price to pay if the book helps keep the left at bay in the all-important 1978 parliamentary elections.

The word for the job? Moderators to me have always been something to do with the Church of Scotland, so it was intriguing to see the word crop up as "Moderator" at the Meeting between a delegation from the Government of the Republic of Zaire and representatives of an international group of commercial banks acting as agents for certain syndicated bank loans to Zaire.

The background to the story since he has been involved in a number of similar (but inter- in arrears on certain foreign



"Well, brothers, I suppose we have the Government to thank for enabling so many of you to be here to-day."

currency loans and for perhaps the first time the commercial sector got together to try and organise a settlement (such meetings are not uncommon between governments). However, there is always the danger of acrimony creeping into such meetings and an impartial chairman is an obvious necessity.

However, the word chairman implies perhaps rather more authority than the Zairis or the banks thought appropriate: hence the cast around for an alternative and the emergence of "moderator."

The choice for the job fell on G. J. MacGillivray—a Bank of England man, although he is at pains to point out that in this situation he acted purely as an individual. His own background made him an obvious choice since he has been involved in a number of similar (but inter- in arrears on certain foreign

has become known as the "Paris Club," since that has usually been the venue for these meetings. He has helped in the restructuring or refinancing of loans for a number of governments during that time, including Chile, Argentina, and Indonesia.

Touche

This story is supposed to be true (although I have a sneaking suspicion that I have heard something in similar vein before). A friend claims that while waiting to get on to the first tee on a local municipal golf course on a recent Sunday afternoon he turned round to discover that the vicar was next in the queue.

Jocularly he asked the vicar, "Isn't it a sin for you to be playing golf on a Sunday?" The vicar smiled tolerantly, but said nothing until my friend hit what could most favourably be described as an unremarkable drive off the first tee. Then the vicar quietly remarked, "My son, it is a sin for you to be on a golf course any day of the week."

A moral tale

A newly crowned African chief was so impressed with his tribal throne that he became obsessed with thrones in general and started to collect them. As his collection grew he commissioned a local builder to add a loft to his hut where he could store them.

Inevitably, one day, the weight of the accumulated thrones became too much for the supporting roof, which collapsed. The moral of this story is that people who live in grass houses shouldn't stow thrones.

Observer

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FINANCIAL TIMES SURVEY

Monday September 6 1976

AEROSPACE

This week's Farnborough Air Show will herald a new era in aviation. Heavy purchases of civil and military products are anticipated world-wide in the years ahead, but the scene will also be dominated by changing political, economic and sociological requirements, and fresh patterns of international collaboration will emerge

BRITAIN'S AEROSPACE. The future for world aviation industry goes to this year's at all levels seems therefore to be secure. The major objective of the Farnborough International Air Show in a more uncertain mood than at any previous time. This is not going to be easy, but the industry is already formidably from the big U.S. manufacturers, and is becoming a more significant role in the world market. The industry is already formidably from the big U.S. manufacturers, and is becoming a more significant role in the world market.

With the world moving out of the industrial recession of the past three years, virtually every analysis of future world aviation markets is optimistic. The market for airliners of all kinds has been forecast at \$45bn. (about £25bn.) or about 3,000 aircraft by 1985. The military market up to 1990 is estimated to amount to some 6,000 combat aircraft, worth around £30bn.

Even in the "general aviation" field for light transport and other types of aircraft it has been estimated that more than £1bn. of business over the next ten years is waiting to be won in the EEC countries alone, with several times that volume of business likely to be available worldwide.

In the helicopter field, the world market up to 1985 has been estimated at up to 23,000 aircraft of all kinds, of which about 15,000 will be military and the rest civil, at an estimated cost of about £10bn.

Interrelated

These two issues are closely interrelated, if only because the Government, on acquiring craft of all kinds, would then become directly responsible for approving and financing the industry's future

civil work-load. It has to be accepted that, even if holders of the companies in nationalisation were at this late stage to be defeated politically, the Government would still find itself playing a significant role in financing any future new way. Even at middle management levels, earlier opposition to the industry's lack of funds to undertake such financing for itself.

So far as nationalisation itself is concerned, the Government's plan to take over the British Aircraft Corporation, Hawker Siddeley Aviation, and Hawker Siddeley Dynamics and Scottish Aviation is still moving through Parliament. While it is still always possible that the Bill could be defeated or substantially amended in the House of Lords, there now seems to be a strengthening belief that it will reach the Statute Book before the end of this year, with Vesting Day likely to be set for some time in the New Year.

Despite the fact that the Bill has been bitterly contested in Parliament, and that some new ventures can proceed, so

ship, with an increasing concern, least "continued political arguments jeopardise or other wise delay the vital issue of settling work-loads for the future. For this reason, Opposition statements that it would be the intention of any future Conservative administration to denationalise the industry have been greeted with some concern in the industry. It is believed by many in the industry that such a step could cause further serious unsettlement at a time when the basic need is for a period of stability within which the design, development and production of new ventures can proceed, so

internationally collaborative, rather than a "go it alone," basis—the requirement for facilities, including factories and airfields as well as manpower, seems also likely to decline. It is difficult to avoid the conclusion, for example, that even without nationalisation the two big civil aviation centres that have been built up by Hawker Siddeley Aviation and BAC One-Eleven jet production is being sustained with the aid of a Government grant while the company vigorously seeks new orders. In the smaller aircraft field, the outlook seems brighter, with a continued steady sale of Hawker HS-748s and HS-125 executive jets.

On the military side, the U.K. industry is exceptionally busy.

Full production has been authorised on the Tornado multi-role combat aircraft; there is continued production of Jaguars and Harriers; work is well under way on the Hawk trainer, and the Maritime Harrier is under development, with the prospect of a new programme with the U.S. on the AV8B Harrier, and an eventual Jaguar-Harrier replacement also under consideration.

But many of the industry's civil programmes are either running down (for example the Concorde supersonic airliner production line), or are surviving on a comparatively low level of orders. While work on Airbus wings remains high, the Hawker Siddeley Trident line is now dependent upon the outstanding aircraft being built for the Civil Aviation Administration of China, and BAC One-Eleven jet production is being sustained with the aid of a Government grant while the company vigorously seeks new orders. In the smaller aircraft field, the outlook seems brighter, with a continued steady sale of Hawker HS-748s and HS-125 executive jets.

On the military side, the U.K. industry is exceptionally busy.

Thus, it would appear prudent at this time for the U.K. industry to look more closely at the possibilities of that what the U.K. industry needs more than anything else some significant design and

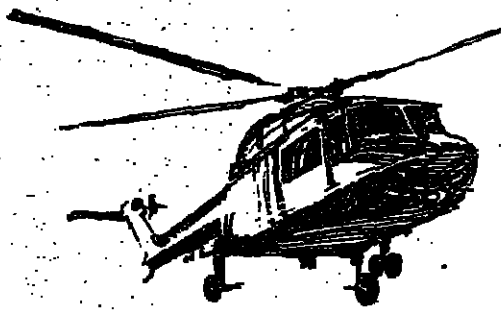
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World outlook bright

By Michael Dome, Aerospace Correspondent

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HELICOPTERS

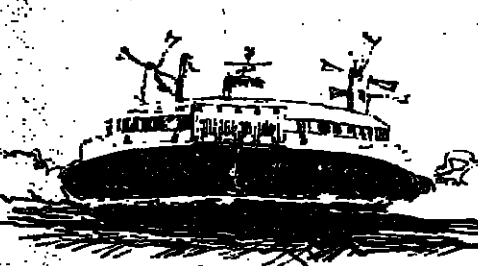


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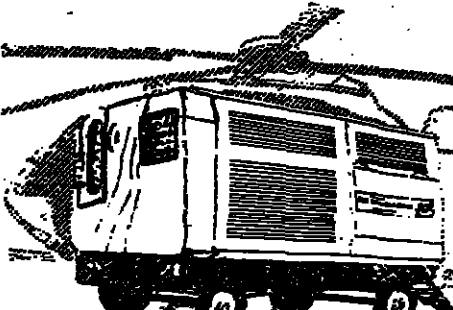


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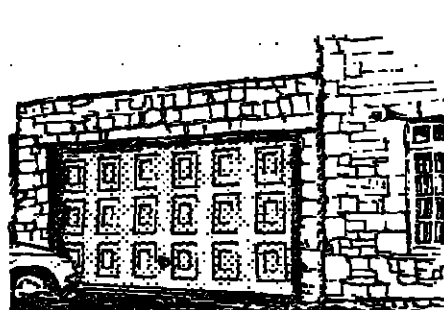


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AEROSPACE II

Outlook

CONTINUED FROM PREVIOUS PAGE

development responsibility, in the production of one or more of the new aeroplanes now envisaged in the U.S.

These include a wide range of types—the Boeing 737 “family” of jets, including a medium-range type, the 737 variant of the short-haul 737 jet, and the McDonnell Douglas DC-X-300—and the U.S. manufacturers themselves have made no secret of their desire to attract overseas partners and finance.

It has long been fashionable in some sections of the U.K. industry to speak disparagingly of becoming “mere sub-contractors” to the U.S. industry. But the fact remains that in a world short of new aerospace designs and cash, especially on the civil side, any kind of work is necessary for long-term survival. While the number of new types of aircraft that will emerge in the future may be limited, it is likely that the numbers that will be built of each type will be substantial. As a result, major sub-contracting programmes are likely to be available for a long time ahead.

While undoubtedly in any discussions with the U.S. the U.K. should strive to achieve some kind of design and development responsibility, matching the cash injections it is prepared to make, sub-contract work should not be despised. For even this will help to keep factories employed, and to maintain contacts with the world aviation scene, against the time when indigenous ventures can again be prepared, with which to attack world markets.

Strive

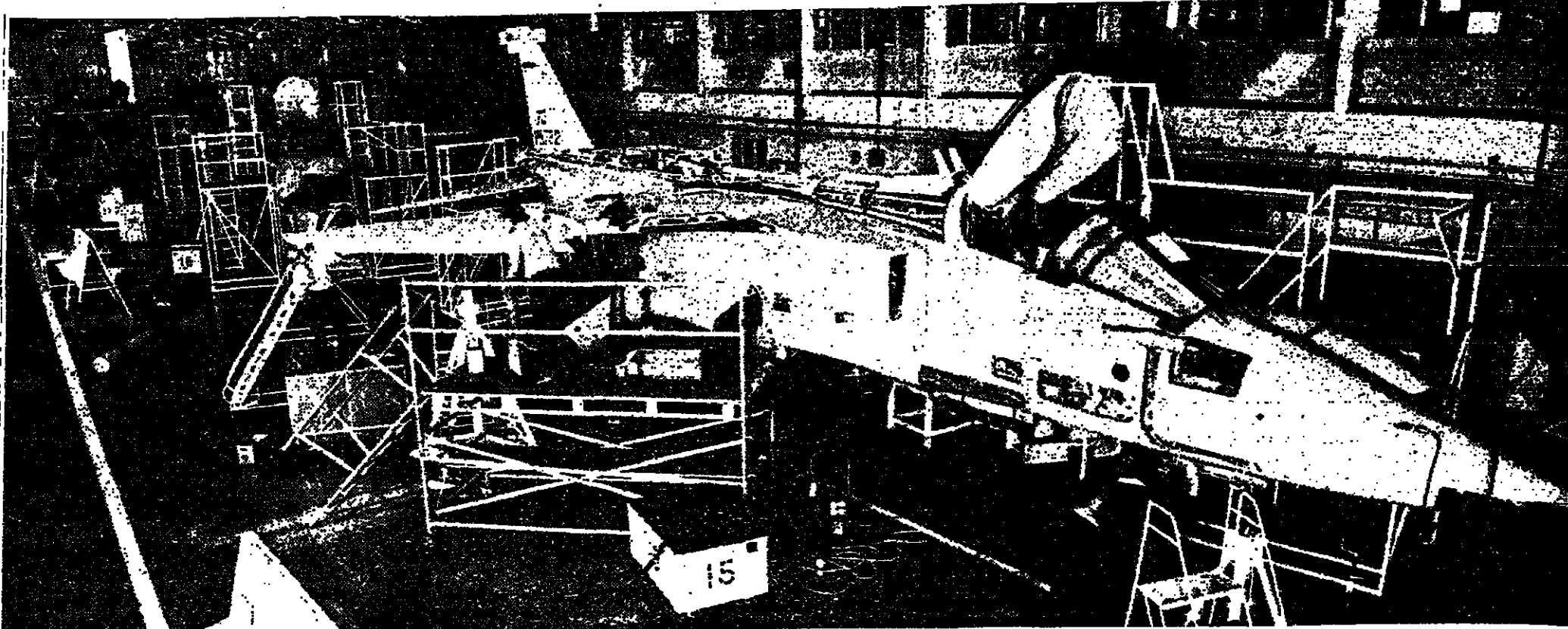
This fact of aerospace life must be accepted if the U.K. industry wants to survive. Unless the U.K. Government

itself is prepared to finance all or the major part of the cost of any new civil ventures—which seems unlikely—it must be admitted that the U.K. is only likely to secure a minority stake in the design, development and production of any new international civil venture, even one that it may initiate itself, such as the HS-146. As a result, any kind of aviation work the U.K. can get in future will be worth having, even if it is sub-contractual rather than basic design and development.

Export

This need for new civil programmes is illustrated most graphically in an analysis of the industry's export performance. Over recent years, the trend has been for exports to rise to new peaks annually, culminating in last year's performance of over £800m, and nearly £450m, in the first six months of this year. While inflation has played its part in boosting these figures, it also reflects the industry's success in selling its wares overseas against continually stiffening competition.

At the same time, the figures do contain an extraordinarily high content for spares—£160m, on aircraft and £140m, on engines (including overhauls) in the first six months of this year. This can be taken as justification for the industry's frequent claims that once any new project is successfully launched commercially, it can go on generating business in after-sales support for anything up to 30 years, thereby justifying launch costs. But the comparatively low level of new sales in the current figures does reflect the fact that many of the existing civil programmes are running down, and that new ventures will be needed to keep the factories fully occupied in the 1980s and into the 1990s.



Assembly of the Anglo-French Jaguar at the British Aircraft Corporation's Weybridge works.

International collaboration

OVER THE past year or so, the production. Unless new orders come in soon at a greater rate than over the past two years, it may be difficult for some of what new civil aircraft ought to be developed for the 1980s and beyond, and what new international industrial patterns will be needed to build them.

This need for new civil work is becoming urgent. Because of the recession of the past three years, only comparatively few of the world's airlines have wanted to buy new equipment, so the manufacturers' order books have shrunk considerably, resulting in reduced rates of those of its competitors have

been cut back even more drastically, as new orders for the McDonnell Douglas DC-10 and Lockheed TriStar jets fell off sharply (although McDonnell Douglas has been sustained by a continued steady flow of orders for its DC-9 short-haul jet). Trijet orders now seem to be picking up again, as the recession ends, but they are still at a very low level.

In Europe, the situation is worse. The A-300 Airbus has been doing better in the battle for orders against the medium-range models of the DC-10 and TriStar than many had

expected (57 aircraft bought or on option), but even so the number of contracts is below the original hopes. Orders for such short-haul types as the Fokker F27 Fellowship and F27 Friendship Airliners continue steadily, but those for the VFW-Fokker 614 feederliner are exceptionally slow. In France, the Mercure 100 programme has been disappointing.

In the U.K., the Fairey Britten-Norman Islander and Trislander continue to sell well, while a small flow of orders continues for the short Skyvan, the HS-748 feederliner and HS-125 executive jet. It is hoped that more orders will emerge soon for the new Short SD3-30 “Commuter” airliner.

But there have been no new orders for the Hawker Siddeley Trident beyond those from China, while BAC's One-Eleven line is currently sustained solely by a small order from Tarom of Romania and the manufacture of five additional aircraft, with Government financial help, in anticipation of orders.

Concorde

In both France and the U.K. moreover, Concorde work is running down fast, with eight of the 16 production aircraft now built and flying, and work on the remaining eight (four at Filton and four at Toulouse) well advanced. (There is no immediate prospect of additional production being authorised by the two Governments until the outstanding aircraft are sold, and additional airline orders emerge to justify new financial commitments.)

There are signs, however, that the demand situation is changing, and it is hoped that, before the next 18 months are out, some major new programmes will be moving from the project offices, onto the factory floors.

One of the most significant signs is that, with the ending of the recession, world air traffic is picking up again, and is expected to grow at an average annual rate of around 8 per cent, at least until 1981. Beyond that, the airline observers are too cautious to predict, but the general belief is that the expansion by then will be seen to be well established, and therefore likely to continue through the 1980s.

This, in turn, is expected to help the airlines overcome much of the over-capacity situation (too many seats chasing too few passengers) that has plagued them for a long time, often stemming from the substantial fleets of wide-bodied jets they over-ordered before the recession began. It seems likely, therefore, that the airlines over the next year or so will start to look more eagerly for additional aircraft with which to meet the anticipated expansion in world air traffic. Some are already back in the market for good second-hand jets.

At the same time, many of the airlines will also be looking for replacement aircraft for those parts of their fleets that will be ageing. In many cases, airlines have fleets of long-haul Boeing 707s or Douglas DC-8s, medium-haul Boeing 727s and short-haul Boeing 737s, Douglas DC9s, BAC One-Elevens and other jets that have been in service for many years. By the early 1980s, many of these aircraft will be 15 to 20 years of age. They will also need replacing because of the increasingly stringent environmental regulations, particularly relating to noise, that can be expected by the early 1980s.

The need for increased fuel efficiency, stemming both from rising fuel costs and the need to preserve as much as possible declining fuel reserves, will also dictate the purchase of new fleets. While it is already possible to modify many of these older jets to comply with the stricter noise regulations, the

direct cost of doing so is high, involving some payload penalties, while the noise improvements resulting are so marginal that in many cases it seems the airlines will prefer to phase these aircraft out and buy new equipment.

This is especially so because whatever the airlines buy now will have to serve them for the best part of the next 15 years—through to the early 1990s and perhaps even to the end of this century. They will need, therefore, equipment that goes far beyond today's models in terms of both environmental acceptability and fuel efficiency—in turn resulting in demand for new designs.

Boeing, in a recent analysis of the anticipated world market, suggested that it might amount to as much as \$46bn. (in constant 1975 dollars), or about \$35bn, through to 1985, effectively resulting in a market for about 3,000 aeroplanes. Of this market, it suggested that about \$20bn. would be the replacement of existing ageing jets, with the remaining \$26bn. being new purchases to meet the steady growth of air traffic. It further analysed the market as to \$13.6bn. in the long-range field, \$23.1bn. in the medium-range field, and \$7.3bn. in the short-range field, with about \$2bn. in the freighter field.

With this kind of market at stake, the search is on in the world's aerospace industries for the new designs for the future.

Because of the high costs of development and manufacture, it is certain that there will be fewer competing designs than in the past, and that each design will be built by an international consortium rather than an individual manufacturer. The days of each aircraft industry in each country producing competing designs to meet the same requirement are over. Collaboration on an international basis is the essential prerequisite for the manufacture of major new civil airliners, although at the smaller end of the scale, in the business and executive aircraft fields, for example, and even perhaps in the short-haul feederliner business, where development costs are lower, some individual manufacturers may well still be able to produce their individual designs.

As a result of this situation, however, the search for the new designs to meet the major airlines' requirements is being accompanied by an equally complex pattern of discussions among manufacturers to find the most politically and economically suitable consortia to undertake the ventures envisaged.

Recognised

As Boeing's analysis shows, the manufacturers appear broadly to have recognised that the bulk of the future market will lie in the short to medium-range fields. The very long-range and medium-to-long range markets are already dominated to such an extent by the Boeing 747 and its variants (such as the SP Special Performance model), and the McDonnell Douglas DC-10 and Lockheed TriStar tri-jets and their long-range variants, that no other manufacturer in the Western world now wants to waste time and money in getting into these fields. The only possible exception to this situation, would appear to be a requirement for a small number of very long-range aeroplanes, capable, say, of 7,000 to 8,000 miles range, but with comparatively low payloads of 200 (or even fewer) passengers.

In the short-to-medium markets, however, a big future efficiency, stemming both from rising fuel costs and the need to preserve as much as possible declining fuel reserves, will also dictate the purchase of new fleets. While it is already possible to modify many of these older jets to comply with the stricter noise regulations, the

for a 200-220 seater, with a range of 2,500 miles or more. The second is for a 150-b seater, with a range of about 1,500 miles, while the third for a shorter range 80-100 seat type. There are inevitable variations on all of these broad requirements—with the need of some 100 or more scheduled airlines waiting to be met, it is not surprising that there is almost as many ideas as to how to meet them.

During the past few months there have been almost continuous discussions between various aircraft manufacturers in the U.S. and Europe on how to meet those needs. Again, in broad terms, the tendency has been for the European manufacturers and their government to want to see some more closely knit European consortium emerging with which to compete with the U.S. giant while the U.S. companies turn have been anxious to ensure that the formation of such a consortium does not cut them off from their erstwhile lucrative markets on this side of the Atlantic. The pattern of negotiations has probably been more complex than at any previous time in the history of air transport development, and it is no means settled yet.

Upset

Earlier efforts by the Group of Seven in Europe (comprising BAC, Hawker Siddeley, Messerschmitt-Bölkow-Blom, VFW-Fokker, Dornier, Aerospaciale and Dassault-Breguet) to develop a medium-range jet, together with ideas that the U.K. might participate in a B-10 short-medium haul derivative of the A-300 Airbus, appear to have been temporarily upset by the unilateral French proposal for a Mercure 200 airliner, but 45 per cent, by France, 15 per cent, by McDonnell Douglas and 40 per cent, by other countries.

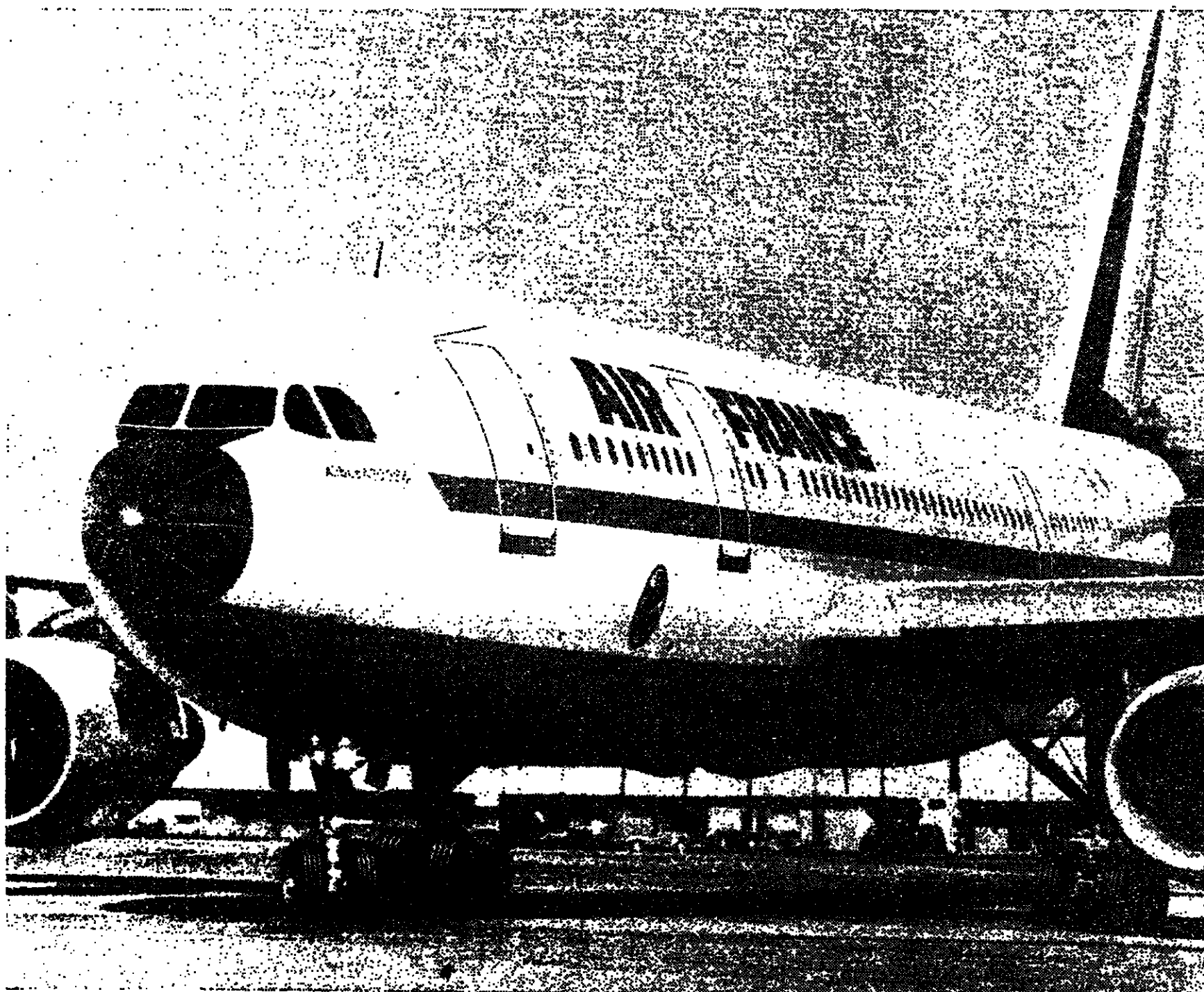
Few in Europe appear to have welcomed this proposal which is seen as cutting sharply across the earlier plan for tighter European co-operation already proposed. It is still subject to detailed discussions, and may yet be either substantially modified or even dropped.

One by-product of this French unilateral decision, however, may be to force the U.K. and other European manufacturer closer together, while it might even result in Boeing of the U.S. itself moving to pre-empt the situation by signing partnership deals with European companies, including those in Britain, a prospect that many in the U.K. are beginning to find increasingly attractive.

Overshadowing these U.K. ideas has been, of course, the uncertainty over the impending nationalisation of the main elements of the British aerospace industry—although to be fair it has been stressed all along by the Organising Committee for British Aerospace that the industry should not allow nationalisation to impede the flow of discussions on what to do next and how and with whom to do it.

This maelstrom of international activity shows no signs of abating. Nothing has yet been settled. Indeed, it is probable that at this year's Farnborough air show the inter-company and international lobbying will be continuing in the chalets overlooking the airfield. It may be some months yet before any clear strands emerge from the tangled skein of planning the next generations of civil aircraft. All that is clear so far is that one era of civil aviation development is coming to an end, while the one which is being shaped to take its place will prevail through to the 1990s and probably well into the next century.

Michael Donne



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AEROSPACE III

Crucial period for Concorde

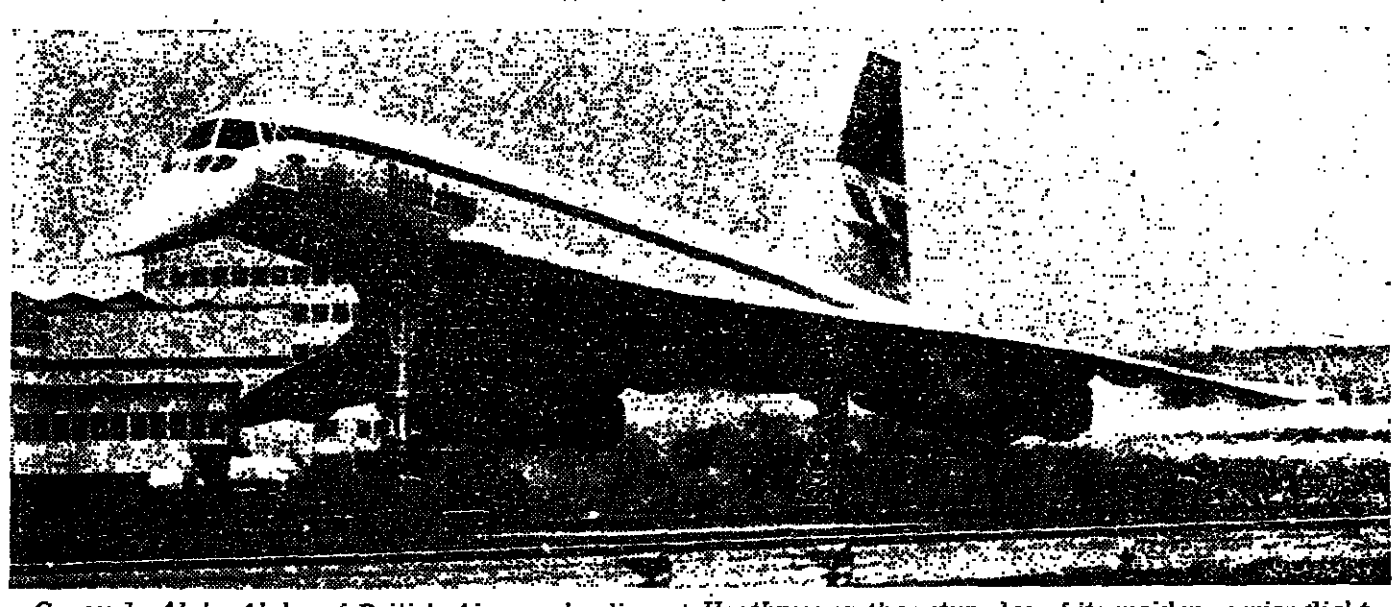
WITH THE Anglo-French 30 per cent surcharge on the Concorde, having accumulated normal first-class fare that is over seven months of airline charged for Concorde service, service with British Airways From these preliminary results, and Air France, it can reason the two airlines have concluded ably be claimed that the super-sonic era is here to stay. What market for supersonic air travel, still remains to be established, and that for this reason the however, is to what extent immediate priority must be the Concorde operations will be expansion of the route network profitable for the airlines, and at the earliest possible date. when further orders will be received for the five aircraft that remain to be sold out of the 16 production aeroplanes. Originally authorised by the two Governments.

Beyond this, two further questions still to be answered are whether there will be further production orders for the present generation Concorde, and whether a "second-generation" aeroplane will be authorised in the not too distant future.

So far, both British Airways and Air France express themselves well satisfied with the results of their Concorde operations. This is despite the fact that neither airline has yet been able to introduce Concorde on to the most lucrative route of all, the North Atlantic between New York and London, pending a satisfactory settlement of the current legal arguments on this matter (stemming from the six months' ban imposed on Concorde operations at Kennedy International Airport by the Port of New York Authority).

Load factors on the routes between London and Paris and Washington are described by both airlines as excellent, running at over 90 per cent, with a high level of forward bookings, while on the route between Paris and Rio de Janeiro they are exceptionally good, on the route between Paris and Caracas marginally satisfactory, and reasonably acceptable between London and Bahrain. BA has so far carried over 7,000 passengers on its Concorde flights.

The level of customer appreciation has been high, with considerable favourable comment about the substantial savings in time achieved by supersonic flight, and the comparative freshness of the passengers on arrival, with only a few complaints about the



Concorde Alpha-Alpha of British Airways landing at Heathrow on the return leg of its maiden service flight to Bahrain.

Concorde is damaging the environment—for example, by so reducing the ozone level as to permit an increase in ultraviolet radiation on earth—still has to produce conclusive results one way or another.

So far, however, both Air France and British Airways have every reason to be confident that the 18 months' trial will be followed by a clean certificate of operational health from the U.S. Government.

It is hoped that long before then, however, the current legal problems that are preventing services to and from New York will have been solved, and that at least some token passenger services will be in operation. Again, much influence on the New York situation is likely to be exerted by the results of the Washington monitoring programme—which are being published on a monthly basis by the U.S. Department of Transportation. The more that it can be demonstrated factually that Concorde is not as noisy or as damaging as has been claimed, the weaker the case for the continued ban on the aircraft at New York becomes.

Thus the next six to 12 months will be crucial for the Concorde. In that time it should be able to demonstrate to all that it is an acceptable addition to the world's air transport network in both economic and environmental terms. This in turn should convince a number of other major airlines that the aircraft is worth having, and hopefully the remaining aircraft out of the 16 production models authorised can be disposed of. Whether these aircraft will be sold outright to interested airlines, or whether they will have to be leased because of the high initial capital cost of buying them, remains to be seen.

Certainly, at £30m. a time, few airlines can afford them, and there is growing pressure on the U.K. and French Governments to introduce some form of leasing scheme that would enable groups of airlines or even individual operators to get into the supersonic era.

This is important, because upon how the two Governments dispose of their remaining aircraft depends whether or not

Perform

Everything, therefore, depends upon how well Concorde continues to perform in operational service over the next few months. If it proves to be economical and socially acceptable, other airlines may be stimulated to buy or lease. This in turn will make not only the production of additional aeroplanes feasible, but also encourage other countries to agree to accept Concorde flights to and from their cities—which in turn will help to stimulate demand for the aeroplane. If, however, Concorde proves to be uneconomic, and socially unacceptable, the future of supersonic civil aviation, at least in the shape of Concorde, will be bleak indeed.

There remains the question of any second-generation aeroplane. At present, it seems that this must be some 10 to 15 years away at least, if only because of the high cost involved and the demands of new subsonic civil aviation developments on available government and industry resources. Moreover, any such development would have to be an internationally collaborative venture, with the aerospace industries on both sides of the Atlantic joining forces, and with all their governments also involved (since no individual company or group of companies could afford the cash involved). It seems likely, therefore, both that Concorde and the Soviet TU-144 (which has not yet entered fare-paying passenger service) will have the field to themselves for some considerable time to come.

M.D.

Complex

The Indian situation is more complex, for it stems from a reluctance by the Indian Government to permit supersonic overflying at a time when the U.K. Government itself has not yet approved a supersonic corridor over the U.K. This is due to concern by the Indian Government over sonic boom, but there is also the question of what the U.K. can offer India in return for Concorde flights. Supersonic overflying of the Indian sub-continent is highly desirable. While British Airways could, at a pinch, fly round the southern tip of the Continent, this would add a penalty in terms of time, and of payload,

to Concorde operations especially in the summer at Bahrain, for example, which BA would prefer to avoid if it could.

It has been suggested, for example, that the total flying time between London and Melbourne by Concorde would be raised from 14 hours 15 minutes to about 17 hours if the more southerly route were used. Even though this would still be substantially better than the current 23 hours 25 minutes taken by subsonic jets, every minute added to the supersonic time represents a diminution of Concorde's advantage, especially if, as expected, competitor airlines introduced "one-stop" subsonic services on the route with Boeing 747 long-range aircraft in a battle to keep traffic away from Concorde.

There is a possibility that some technical improvements can be made to Concorde to improve its payload-range performance on this route (one being to move the centre of gravity of the aeroplane aft so as to enable the existing tanks to carry more fuel), but even so, the most desirable solution must still be the supersonic corridor across India.

These discussions on Indian over-flying rights have been under way throughout this summer, but no results have yet materialised.

British Airways remains hopeful, however, that sooner or later this situation will be settled, and that some time in 1977 it will be able to extend its Concorde services through to Singapore and Australasia.

Once a Concorde service to Singapore can be established, the whole of South-East Asia and the Pacific basin becomes available to the supersonic airliner, either on BA's own operations or on a leasing basis to other airlines. Serpents a diminution of Concorde's advantage, especially if, as expected, competitor airlines introduced in 1977. Flights to Tokyo introduce "one-stop" subsonic services on the route with Boeing 747 long-range aircraft in a battle to keep traffic away from Concorde.

Also now in the negotiating stage are Concorde rights across the Soviet Union, via Novosibirsk, to Tokyo. Clearly, such flights cannot start until clearance is received both at Tokyo and from the Soviet Union. The former depends upon the Japanese attitudes to the environmental situation, while the latter depends upon the progress made with the Soviet Union's own TU-144—for clearly that country will not allow trans-Siberian Concorde flights

until similar flights can be made by the TU-144.

No date for this operation can be given at this time. The best that can be hoped for is that as services continue on a regular basis to other major cities, the volume of technical and environmental operating data that is accumulated will go a long way towards reassuring airlines in other countries that the aeroplane is not the fearsome monster that it has been claimed to be, but just another aeroplane that can fit into the existing airline pattern with a minimum of disruption.

Significance

For this reason, the current 36 months' trial of Concorde in the U.S., which officially began with the first Concorde flights to Washington last May 24, is of considerable significance. The outcome of this extended period of study into all aspects of Concorde's operation will eventually determine whether or not the aircraft can fly into other cities in the U.S.

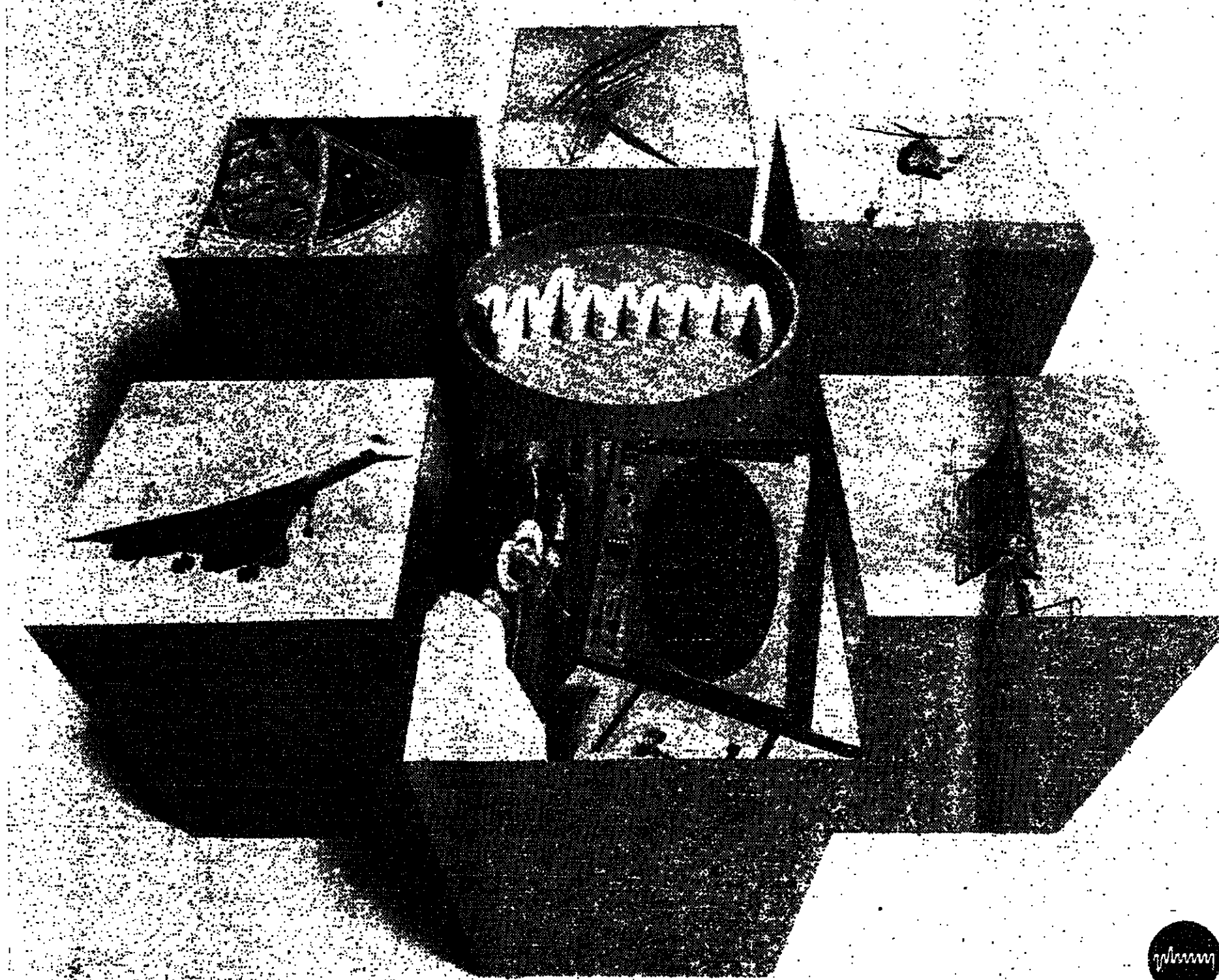
But it is also likely to be taken as a yardstick against which the attitudes of other countries will be determined. Final acceptance of the aircraft by the U.S. at the end of the 16 months' trial will not only make possible the start of services to

such major centres as Chicago, Dallas, Miami, Los Angeles and San Francisco, but will also almost certainly convince other governments in South America, Africa and South-East Asia and the Far East that Concorde is after all a reasonable proposition.

It is probable, however, that even before the late summer of 1977, when the 16 months' U.S. trial is planned to end, the acceptability or otherwise of Concorde will have been established beyond question—for Mr. William T. Coleman, the U.S. Secretary of Transportation, has said that if at any time during the trial there is adequate evidence that Concorde is too noisy or otherwise deleterious to the environment, he will not hesitate to cancel its right to fly into Washington.

So far, there does not appear to be any reason to believe that this is likely to happen. While initially the noise readings at Washington's Dulles Airport were comparatively high, this was attributed to lack of familiarity by pilots with the operating procedures, and as experience has developed, so have the pilot's skills in operating the aircraft in accordance with local noise abatement procedures. At the same time, however, the monitoring programme designed to show whether or not

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AEROSPACE IV

The next generation of aero-engines

IN THE aero-engine field, as in the civil airframes industry, the manufacturers' minds are dominated by thoughts of the big markets that lie ahead for a new generation of airliners, especially in the short-range and medium-range categories, that will require a new generation of engines.

In fact, these new airline markets of the future are only likely to emerge when the aero-engine manufacturers can satisfy the airframe manufacturers and the airlines that they are capable of producing power-plants that will meet the increasingly stringent noise regulations and equally tough demands for greater fuel-efficiency, that will prevail not only through the 1980s, but into the 1990s and even perhaps the next century.

The life of any modern aero-engine now extends well over 20 years, because the soaring development and production cost of any "new technology" power-plant is so high that it takes that length of time to recoup the development costs and earn profits.

At the same time, these same high development costs are making it virtually impossible for any one manufacturer to undertake a major engine development on his own, so that international collaboration is becoming the accepted rule in aero-engine development as much as in airframe development.

It has also become clear that while markets for individual successful engines are likely to be substantial, there is no room for more than two or three competitive engine designs in any of the major categories involved—short, medium and long-range.

In the long-range "big engine" field, the battle is still between the three giants—Rolls-Royce with its RB-211, Pratt and Whitney with its JT-9D and General Electric with its CF6 series.

In the big medium-range market that is likely to open up in

the 1980s, it is possible that smaller-thrust derivatives of these big-thrust engines may be developed while another possibility is that a new generation of smaller engines may also emerge, depending entirely on what size of aircraft the airlines choose to suit their future needs.

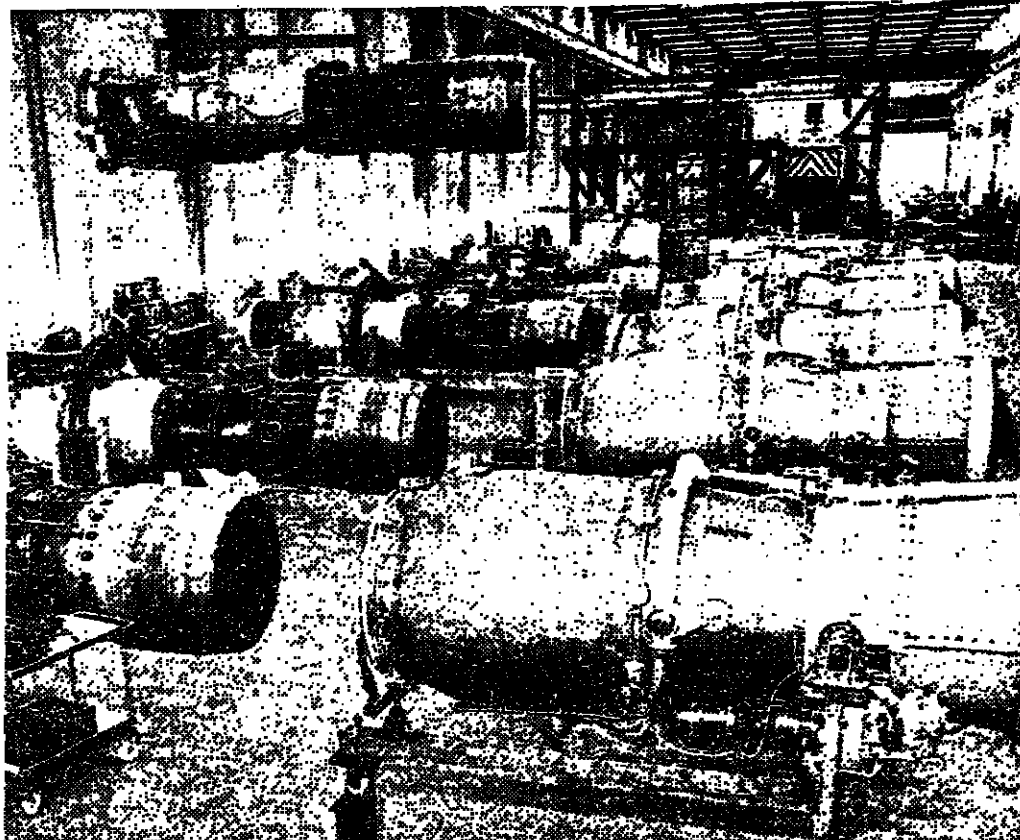
In the short-range field, Rolls-Royce has developed the new RB-401, a "Viper replacement" primarily intended as a power-plant for the next generation of business and executive aircraft, but which could also power the smaller 100-seater transports that are envisaged for the future, together with military aircraft and heavy helicopters. At present, Rolls-Royce is still discussing with the U.K. Government the question of some financial support for the development of the RB-401.

World market

But it is in the medium-range field that the biggest commercial engine battle of the future is expected to lie, since the new generation of short-to-medium range airliners is expected to account for about half the total world market of some \$46bn. for airliners of all types through to 1985, with further substantial sales beyond that.

Various estimates have been made of this world market, but it is thought unlikely to amount to less than 3,000 aeroplanes, of which a round 1,500 are likely to be in the short-to-medium range categories. Since each aeroplane is likely to be either twin-engine or three-engine, the engine market in these classes alone is likely to amount to some 4,500-5,000 units, including spares.

The precise nature of the power-plants for this new generation of short to medium-range airliner cannot be determined until the airlines themselves have made it clear whether they want a twin-engine or three-engine aircraft. If they opt for a twin,



Production of Rolls-Royce Spey turbofan engines.

the market could probably be met adequately by "de-rated" versions of the existing big thrust engines, like the RB-211. If, however, they want a three-engine aircraft, then there will be a demand for a new breed of engine, such as the already-proposed Pratt and Whitney JT-10D, on which Rolls-Royce has been discussing the possibility of collaboration. While both Pratt and Whitney and Rolls-Royce, together with MTU and Fiat, have done some work on the power-plant, and a "demonstrator" engine has run on the test-bed in the U.S., the final details of the collaboration between these four companies has yet to be settled.

Whereas originally, the JT-10D had been considered virtu-

ally a certain development for the future, its position has been rendered less certain by this doubt about future airline twin-engine or three-engine needs.

It has been estimated that the overall development cost of the JT-10D could run to as much as \$400m. or more, so that the 34 per cent. share that Rolls-Royce might have (with Pratt and Whitney having 54 per cent., MTU 10 per cent. and Fiat 2 per cent.) would cost about £150m.

In the meantime Rolls-Royce continues to push ahead with its own big engine, the RB-211, competing with Pratt and Whitney on the JT9D and General Electric on the CF6 series.

So far as the \$2,000 lbs thrust version of the RB-211 is concerned, the Dash 22, Rolls-Royce is making payments to the Government, which amounts to a profit for the latter on its early investment in development of that engine. The Government will receive £50m. of and it is estimated that eventuality payments for the first 555 RB-211s. This compares with a loss of up to £45m. which was forecast in 1971, when the old Rolls-Royce collapsed and the new Rolls-Royce (1971) was established.

Over 540 RB-211s have so far been produced, and this engine has become the biggest export programme of the U.K. aerospace industry, with engines and spares worth more than £420m. already manufactured, mainly for export. Last year, the engine earned £96m. in foreign currency, mainly dollars, for engines delivered to Lockheed for use in the TriStar tri-jet.

After Rolls-Royce (1971) was formed five years ago, it was predicted that the RB-211 programme could cost the Government up to £150m., including the prospective loss of £45m. mentioned, on the first 555 engines, because manufacturing costs were expected to exceed payments received from customers. However, this loss has turned into the £50m. profit as a result of improved efficiency by Rolls-Royce, and more advantageous conditions than originally forecast. Instead of costing the Government £150m., the net cost will be only about £115m., and this has been achieved during a period of unprecedented inflation.

Levy payments

The Government will continue to receive a return from the RB-211 after the 555th engine has been sold, through a levy of 7 per cent. of the selling price of each additional engine. It has already received substantial levy payments, returning all its investments, in the earlier Dart and Spey engines.

Rolls-Royce has also developed a 50,000 lb. thrust version of the RB-211, the Dash 324, which will enter service next year powering the long-range Boeing 747 Jumbo jets ordered by British Airways and TriStars ordered by Saudi Arabian Airlines. Launch costs of the Dash 324 are expected to be about £80m. These are being shared by Rolls and the U.K. Government, with the company paying £45m. and the Government contributions again recoverable through a levy on sales. The development of the Dash 324 has widened the market for the RB-211, since in addition to the 747 and TriStar it is being specified for two new aircraft—the long-range L-500 variant of the TriStar and the McDonnell Douglas DC-X-200.

The engine is also considered suitable for the new

developments now envisaged for the future, its position has been rendered less certain by this doubt about future airline twin-engine or three-engine needs. The RB-211 is also in production for pumping natural gas on pipelines in Canada, Holland and the U.K. With its growing range of applications in both the civil aviation and industrial fields, the RB-211 is expected to remain in service well into the next century. A further development to 53,000 lbs thrust is now under way, scheduled for service in 1980.

Collaboration

In the military field, the other major international collaborative engine programme now under way is the RB-199 engine for the European Anglo-German-Italian Tornado multi-role combat aircraft. This engine is being developed and manufactured by a consortium comprising Rolls-Royce, Motoren-und-Turbinen, Union, and Fiat, called Turbo-Union. It is estimated that eventuality payments for the first 2,000 engines will be required, including spares, for the 800 Tornado aircraft that will be built over the next ten years, including 385 for the RAF, 324 for West Germany and 100 for Italy.

Thus, the RB-199 will involve a production commitment that matches American orders in size, and which will be the largest of its kind ever undertaken in Europe. Since manufacturers "learning curves" favour the larger production runs, it is expected that the costs of the RB-199 will be lower than they might otherwise have been if smaller quantities were ordered.

At this stage, with emphasis on the Tornado, it is not known whether the RB-199 will find uses in other military aircraft for the future, but on past experience it seems more likely that derivatives of it will emerge over the next 20 years or so, so that it will become one of the world's great military engines.

Among its other major engine programmes, that are likely to sustain the company in the future, are the military Adour programme, and the civil Spey and Dart. The Adour engine powers both the Jaguar strike/trainer and also the Hawker Siddeley Hawk which is on order for the RAF, and the Japanese T-2 strike/trainer. Over 950 Adour engines have now been delivered for these three types of aircraft. Orders have been placed for more than 700 Adour-powered aircraft, of which over 300 have been produced. Further development of the Adour to higher powers is in progress, and market forecasts indicate that total Adour production will exceed 8,000 engines.

The Spey turbo-fan has now been in service for over 12 years, and has accumulated over 13m. running hours with the eight types of civil and military aircraft it powers. More than 4,300 civil and military Speys have now been built or are on order, while in addition Rolls-Royce has an £80m. agreement for the licensed manufacture of the military Spey in China, and for an initial supply of those engines.

The Dart engine, first developed 30 years ago, is still one of Rolls-Royce's major money-spinners, in the Hawker Siddeley HS-748 and Fokker F-27 airliners. Over 8,700 Darts have been built, and new engines continue to be built at a substantial rate.

M.D.



View from the window of a Lockheed TriStar showing one of the three Rolls-Royce RB-211 turbofans.

Private flying levels out

DESPITE the many unfavourable factors over the past few years which should have been detrimental to private flying in Britain, most clubs continue to attract new business and some have had to refuse new members. But, the number of light aircraft being sold to individuals and clubs has suffered considerably from high costs, which have been further escalated by the devaluation of sterling.

With around 90 per cent. of these aircraft coming from the U.S., the currency problem has been even more acute and the price of an average aircraft has risen to between \$25,000 and \$30,000. As a result, the price of second-hand models has also risen sharply.

On the other hand, the cost of gaining a licence has, in relation to other leisure activities, remained fairly stable. Charges now range between £15 and £20 an hour and expenditure of about \$600 to obtain a private flying licence is considered average.

As one club points out, this is not excessive when compared with the average holiday abroad. It is felt that the element of escapism involved in learning to fly is one of the major attractions, despite the overall fall in the level of disposable income brought about by economic conditions.

Difficult times

The level of private flying activity is estimated to have remained stable in the past two years, with a notable increase in the north of the country. This year the favourable flying conditions have also contributed to the overall position.

But times have been difficult for smaller and less financially healthy clubs, and a number of these have closed, with the larger operators apparently gaining the displaced membership. Similarly, there are reports that the number of individuals maintaining their licences has dropped.

In Europe, there has also been a favourable level of activity, particularly in France, where Government policy on providing facilities for private flying has been an important factor in boosting public interest.

British policy for the South-East was outlined earlier this year in a Civil Aviation Authority document entitled Airfields

for General Aviation in South East England, which was the second report of the Standing Conference on London and South East Regional Planning and the Civil Aviation Authority.

In the first document a number of projections on traffic volumes were made. Aircraft movements in the flying club sector were expected to rise from 935,000 in 1973 to 1.7m. in 1978, and business and recreational use from 84,000 to 189,000.

These forecasts were based, however, on a number of critical assumptions, the second document points out, in particular that the economic growth rate for 1973 to 1985 would average at the historical long-term growth rate. It was assumed that in the long run fuel prices would stabilise but that recreational flying would be much more sensitive to any increase in fuel prices than business flying. In the event, fuel costs had risen at a lower rate than was experienced in 1973 and 1974.

The report concluded that it was too early to give an estimate of the extent to which the patterns of demand were following the trend projected, but recent statistics suggested a setback in levels of activity since the preparation of the forecasts. The depth of the recession made it unlikely that the 1985 forecast levels should be reached before the late 1980s.

It was emphasised that in view of the long-term nature of the exercise, the precise year in which the forecasts were achieved was not in general critical to any proposed solutions to problems.

A number of factors besides the increased price of fuel were responsible for the fall in the rate of growth of general aviation activity. These included the imposition of higher rate of VAT on general aviation aircraft and the unusually wet winter of 1974-75. However, suggestions that tax incentives may encourage the purchase of aircraft were not borne out by any evidence, the report said.

In some respects the recommendations made in the report may be discouraging private flying interests. For example, it is suggested that at airfields where situations of conflict arise in the accommodation of growth in both business and recreational flying, priority should in most circumstances

be given to the business sector. The rationale for this is the demand for business flying is likely to grow faster than any other form of general aviation and is commercially most important. But the report adds:

"The few airfields most appropriate for business activity should concentrate upon the accommodation of future growth in business aviation although not necessarily to the exclusion of recreational flying."

Six airfields have been named as the most appropriate for accommodating more of the expected growth in demand for business activity: these are Leavesham, Northolt, Biggin Hill, Blackbushe, Shoreham and Southampton. It is pointed out, for example, that Biggin Hill's potential for handling business activity is limited by its extensive use by flying clubs.

Congestion

The report comes to the conclusion that existing facilities will in general be adequate to meet predicted levels of demand for recreational flying. It adds, however, that there is likely to be some congestion at peak hours and it was considered that for the foreseeable future such congestion would have to be accepted.

Nevertheless, there were certain airfields where congestion was likely to reach intolerable levels unless action is taken, most notably at Biggin Hill. For that reason, no further growth in recreational flying at Biggin Hill was desirable.

It is suggested that a substantial proportion of growth in club activity there might be displaced by increased business traffic and should be transferred to West Malling. Similarly, private flying at a number of more centralised airfields is likely to be transferred to more rural areas if the policy outlined is put into effect.

The effect of such a policy on private flying, if pursued on a country-wide basis, would certainly not be of benefit to the level of activity, most experts agree. Furthermore, seen in the context of the U.S., where municipal airports have been specifically developed and where 95 per cent. of airports do not charge the user, U.K. policy would appear to be lagging behind.

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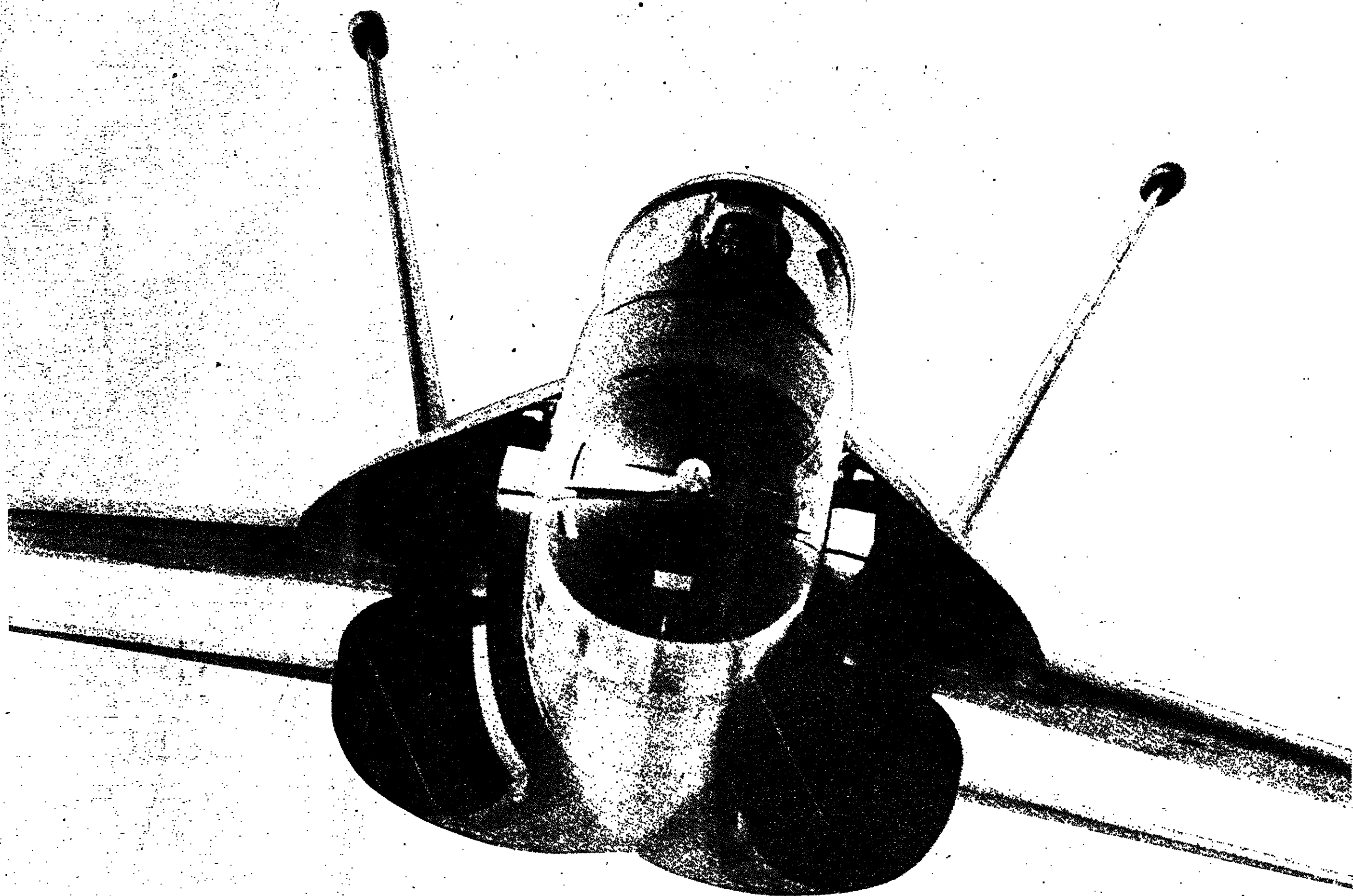
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NORTHROP

AEROSPACE VI

The scope for business aircraft

ALTHOUGH business flying continues to be a growth sector of world aviation, Britain and Europe continue to lag well behind the U.S. in their use and application of these aircraft. But if the level of business flying in the U.K. has yet to recover from the effects of the increases in fuel and overall operating costs over the past three years, it is in general better than expected in view of economic conditions.

In Europe, sales of business aircraft in West Germany have been encouraging, although manufacturers continue to be of the opinion that the structure and density of surface transport facilities already available in EEC countries means that this market will always be limited when compared with the U.S.

However, a recent study carried out by Frost and Sullivan

gives a more optimistic view, suggesting that expenditure on general aviation aircraft in Common Market countries over the next 10 years is likely to be worth £1bn. at end-1975 values. They predict that growth will resume next year and that £393m. will be spent up to 1980 and, given greater economic activity, £613m. between 1981 and 1986, an increase of 56 per cent.

The study finds that most of the growth in EEC countries is expected to be in business flying, which will benefit from increased business activity and the flexibility not offered by commercial flight. Helicopters are expected to expand their market share significantly.

Sales of more than 2,400 twin-engine aircraft, worth £420m., are expected to dominate the next decade, followed by nearly 14,000 single-engine aircraft

worth more than £200m. and nearly 1,500 helicopters worth £164m.

A market for 190 aircraft of heavier than 3.7 tonnes is forecast, worth £139m., with buying expanding by 33 per cent. in the period 1981-86 over the preceding five years. Britain and West Germany are expected to share equally 73 per cent. of the 10-year market for 28,000 aircraft, with France's share reaching only 13 per cent. and Italy's 4.6 per cent.

Burden

Britain is also seen as the major market for aircraft over 3.7 tonnes and for helicopters, and will be the second largest buyer of twin-engine aircraft. West Germany will be the prime buyer of both single and twin-engine aircraft.

An annual growth rate of 2.5 per cent. in general aviation traffic movements is expected up to 1986, which would lead to increasing use of instrument flight rules and a greater burden on the EEC air traffic control system.

As a result, business aircraft and air taxi services are expected to carry at least VHF, VOR, NDB and SSR transponder equipment. There is a likelihood that a form of height reporting will be mandatory in the EEC by the end of 1978.

However, this long-term projection must be seen in the context of world trends, well illustrated by the fact that Brazil alone will buy about three-quarters as many general aviation aircraft as the whole of Europe. In the U.S., because of the impetus given to business aviation by Federal and State policy on airports, and for geographical reasons, the booming market can be expected to continue.

The Piper Aircraft Corporation, which produces more twin-engine aircraft than any other manufacturer in the world, is enjoying an excellent year, with increased sales, and claims greater market penetration, particularly with its Navajo range.

Recent figures collated by Piper show that there were 4,845 general aviation aircraft in the U.K., of which about 1,000 were Piper manufactured, with Cessna in second place with 790 aircraft.

The U.S. General Aviation Manufacturers' Association pointed out recently that the foremost factor in the general aviation market place was the growing recognition that it was



The Cessna pressurised 421 Golden Eagle.

a transport tool. In the U.S. airlines, this trend is clearly the 14,000 a year built by U.K. manufacturers, also far

underlining the need for continuing general aviation facilities at major airports. There has also been a trend in the U.S. towards smaller business aircraft and a recent study has shown that 64 per cent. of business aircraft are single-engine. The U.S. has about 150,000 single-engine piston aircraft, of which 29,000 are placed by the Federal Aviation Administration in the Series 700, a fan-jet powered aircraft with longer range and greater payload.

The European light aircraft industry manufactures about 1,000 units a year compared to

of the small businessman.

of the small businessman.

of the small businessman.

a surprisingly strong response to the new model, launched in the early summer, with already sold and with good prospects for the sale of another 10. The future of this aircraft in major markets such as the U.S., Europe and Australia, the Far East, is seen as extremely promising.

In the U.K., the fall in selling has increased the cost of buying a foreign aircraft, while giving Hawker-Siddeley some advantage in its market sector, its overall effect on business flying in general, with high proportion of aircraft being imported, is detrimental.

Interlining

There is also continuing concern in Britain over the availability of suitable airports for business aviation, particularly in relation to the need for interlining. Recent consultation documents from the Government on both regional and national airport policy have given any great cause for confidence.

The use of Heathrow remains in the balance, with indications that smaller aircraft will slow be eased out as the volume of scheduled traffic builds up. Gatwick will offer some consolation, but major developments are expected to take place at other airfields. A question mark continues to hang over Northolt, but Leavesden, Blackbushe, Biggin Hill, Shoreham and Southampton have been suggested for development.

Lorne Barlin

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Cargo traffic on the upswing

ALTHOUGH WORLD air cargo traffic has escaped the buffeting to which passenger traffic has been subjected, its rate of decline which set in shortly after the turn of the decade has been causing a good deal of anxiety both to the airlines themselves and to the air forwarders.

But if the monthly tonnages carried by most of the international airlines since the earlier part of this year are measured against comparable months of last year, the indications are that air cargo traffic has emerged from its recession and is once again on the upward trend. That, at any rate, is the view of most airline cargo chiefs and executives of the major forwarders who prefer to back their own judgment rather than that of the professional forecasters.

At the same time, there is considerable doubt as to whether there is ever likely to be a return to the heady levels of growth—ranging between 17 and 21 per cent. a year—to which cargo traffic soared during the latter half of the 1960s and the early 1970s. Since then an average rate of growth of around 7 per cent. is all that the industry has been able to manage, and the most optimistic prediction so far recorded for attainment by 1980 is 10.5 per cent. and a maximum of 11.4 per cent. by 1985.

There are, however, many factors that could distort these forecasts—and not necessarily to the detriment of the industry's recovery. Already developments are under way which are likely to have far-

reaching implications upon the whole concept of air distribution and which, if history repeats itself, could catch the industry on the wrong foot just as happened in the mid-1960s. Then, handling facilities and carrying capacity proved inadequate to cater for the sudden and unexpected upsurge in traffic. It arrived before schedule, and in so doing pipped the post plans that were being implemented for the installation of automated handling equipment, the construction of separate cargo terminal buildings and for the increase in the frequency of all-cargo services as well as the conversion of aircraft for their operation.

Aware

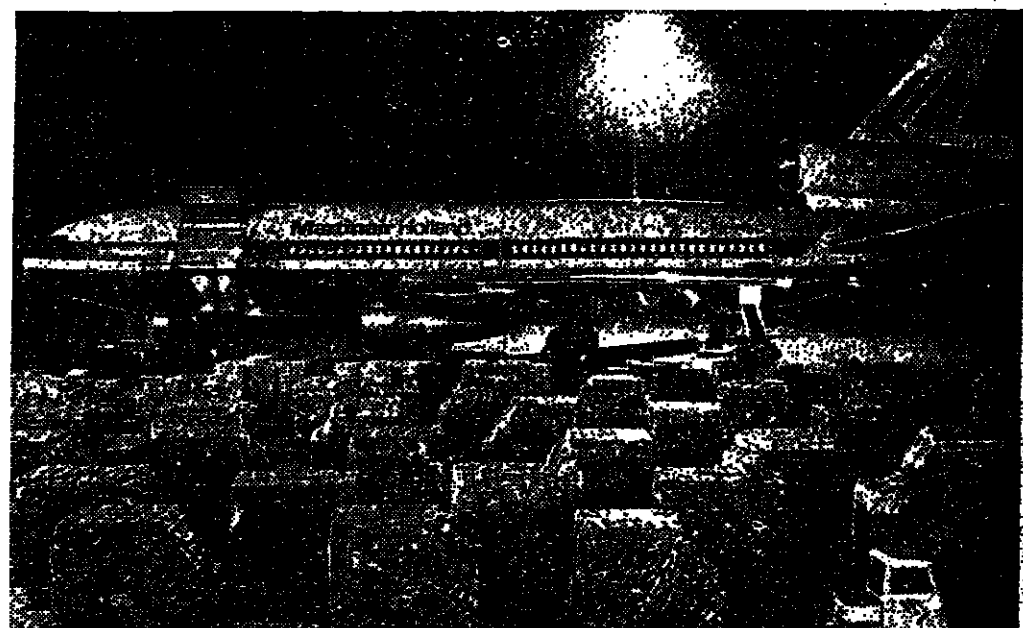
By the same token the air forwarders had become aware of the rôle they would have to play in future development and were beginning to expand and modernise their facilities and to develop consolidation services which until that time had been regarded with a certain amount of reserve but which now account for about 70 per cent. of all traffic moving on scheduled services.

To-day, the industry—and more particularly the scheduled carriers—is thinking not so much in terms of equipment and facilities but in improving what is referred to as the "cargo product," the main ingredients of which are speed, service reliability and a rate to match. The airlines believe that once they have found the formula to produce the right mix of these four essentials they will have in their hands an incentive which will be difficult to resist by shippers who use air freight—only occasionally when the benefits of regular use are spelled out to them.

One of the most formidable problems the scheduled carriers have to face in their search for the ideal cargo product is the challenge of the charter services provided by the independent operators. These are now so highly organised and, in most cases, so efficiently operated that they are attracting increasing volumes of traffic away from the scheduled operators.

Currently, their services proliferate on routes to countries in Africa and the Middle East and to Hong Kong. But the structure of the scheduled airlines' operations lines and ultimately towards enables them to change direct, narrow-gauge and charter flights on all routes. The airline has produced a scheme under which shippers scheduled services—as has been the case, for example, during special low rates in return for the past year with Nigeria, entering into a contract to ship a given tonnage over a period of a year. The rates set by parable on some routes to those British Airways are for 1,500, operated by the scheduled 1,000 and 500 tonnes, and there carriers—and the low rates they are able to offer—often 50 per cent. below the lowest obtainable on a scheduled flight—year to make up the contractual have captured the imagination of shippers and forwarding place any restriction on the agents alike. So much so in nature of the contents.

CONTINUED ON NEXT PAGE



Palletised cargo awaiting loading on a DC-10 of Martinair, one of the independent charter operators.

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مكاتبنا في القاهرة

Glamour fades from space research

MUCH of the glamour that accompanied the early years of space exploration in the late 1950s and 1960s has now evaporated, and space attracts far less public interest and excitement than it did.

There are several reasons for this. One was the growing awareness on the part of the governments and taxpayers who put up the money for space ventures that these were threatening to become a bottomless pit unless more rigid control over spending was introduced. Another was that despite the undoubted technical success of the manned Apollo lunar landing programme, there was some disappointment on the part of the public that there were not greater direct and tangible benefits stemming from it.

Coupled with increasing pressures on available monetary and manpower resources from other directions, these factors have led to a progressive shift in emphasis in space activities in recent years, away from many of the grander aspirations of the scientists towards the more immediately rewarding aspects of space research, such as the greater use of the unmanned near-earth orbiting satellite, for both scientific research and direct technological applications.

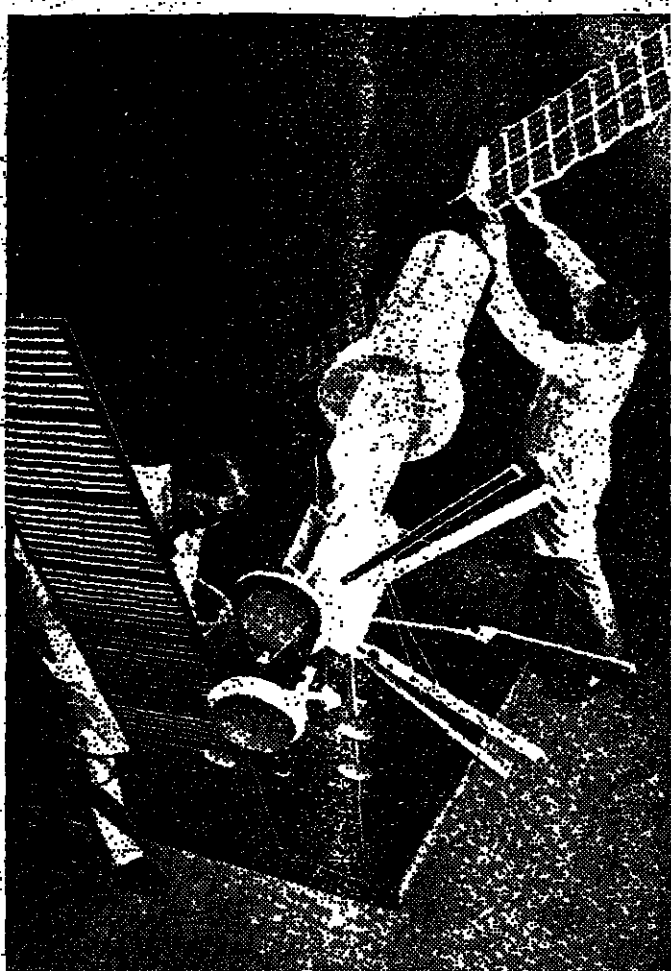
The total number of unmanned spacecraft put into near-earth orbit from October 4, 1957 (when the first Soviet Sputnik was launched) until end-1975 was 1,140, of which 739 were still in orbit at the latter date (the others having been destroyed on re-entering the atmosphere). Many of these satellites have been military spacecraft for a wide variety of missions, but increasingly in recent years the balance has swung towards civil satellites of various kinds for scientific research or technological applications.

Shift

This shift has occurred just at a time when substantial advances are beginning to emerge from the largely unpublished efforts that have been put into the development of unmanned satellites over the past ten to fifteen years. As a result, the unmanned satellite is already achieving some substantial breakthroughs in the advancement of man's knowledge about his near-earth space environment, and is almost daily demonstrating its capacity to extend those benefits further in the decade ahead.

It seems likely, therefore, that while countries such as the U.S. and the Soviet Union will continue to devote substantial funds to unmanned interplanetary probes, such as the recent successful U.S. Viking spacecraft landings on Mars, an increasing share of future space spending is likely to be concentrated upon the more immediately rewarding development of near-earth space.

The most rapid advances in this field have been in the use of near-earth satellites for communications purposes. It is now little more than 11 years since the first commercial geostationary communications satellite, Early Bird, was launched from Cape Canaveral (as it was then known) on April 6, 1965. It followed a series of experimental spacecraft, such as Score (the first communications satellite), Echo I and II, Courier, Telstar and Syncom, the first of



Model of the Seasat orbital satellite—built for NASA by Lockheed Missiles and Space Company—which will monitor the world's oceans.

the geostationary satellites (the name given to satellites whose orbital speed is so geared to the earth's own rotational speed that they remain virtually in one spot over the earth's surface).

Since Early Bird, with its 66 telephone circuits, the expansion has been steady, though the 240 circuits of Intelsat II (so named after the International Telecommunications Consortium) which orbits and relays the Global Intelsat communications satellite system), the 1,500 circuits of Intelsat III, and most recently to the 3,750 circuits and two TV channels of Intelsat IV, while the ground network has expanded to more than 118 earth stations in 78 countries providing round-the-clock service with near 100 per cent reliability.

Continuing this line of development, Intelsat is already working on the Series V "Comsats" which will come into service around 1979-80, providing users with another considerable increase in capacity, each having 12,000 two-way voice circuits. In the meantime, so as to preclude system saturation before that date, it is planned to place in orbit from later this year a number of Intelsat IVA satellites of an improved design and each with capacity of over 6,000 two-way voice channels and two TV channels. While, hitherto, the development of the communications satellite has been largely for telephone, telegraph and TV purposes, the further advances now envisaged in "Comsats" include their use for wide-band data exchanges, especially between computers and data-banks; with the distribution of this and other types of information to a growing number of users, especially in banking, commerce and industry.

But other uses are also pro-

capacity of their own, so that by far the greatest volume of future launches in the Western world will have to depend upon the facilities offered by the U.S. National Aeronautics and Space Administration. These are already becoming crowded, and the situation could become worse in the 1980s as world needs coincide with the increasing requirements of the U.S. itself for launch capacity.

It is to meet this situation that the U.S. has already begun the development of a new system of satellite deployment—the "Space Shuttle" plan for a manned, reusable "space transport system."

Deploying

This is the most revolutionary concept of space application yet devised, and while it owes a considerable debt to the vast amount of knowledge acquired during the Apollo manned lunar landing programme, it carries the concept of men living and working in space much further. The basic aim of the system is to provide a means of deploying satellites in orbit, which could perhaps eventually make existing rocket launcher facilities obsolete, while also extending the ability of mankind to undertake other tasks in near-earth orbit.

The Shuttle will comprise two main elements, a Booster and an Orbiter. The Booster will inject the Orbiter into orbit, and will then fall into the sea for recovery and refurbishing for further use. The Orbiter, however, after completing its mission, will return to earth and land like an aeroplane on a runway specially built at Cape Kennedy in Florida.

The Orbiter will be capable of staying aloft for missions of up to 30 days, during which time its crew will be able to perform a wide range of tasks, including the deploying and retrieving of satellites in orbit, the servicing of satellites, the operation of manned laboratories for astronomy, Earth sciences, space processing and manufacturing, and the development of a permanent manned space station. The first Space Shuttle launch is planned for 1980.

An integral part of the Orbiter will be the Spacelab, a small manned "space laboratory" which is being built in Europe by the ESA, that will fit into the Orbiter's cargo bay, and enable small teams of scientists to work in near-earth orbit in shirt-sleeve comfort, and for periods of up to 30 days at a time. Current NASA planning envisages that about 40 per cent of all Space Shuttle flights from 1980 to 1991 will be missions using Spacelab.

The crews of the Orbiter could consist of up to seven people—the commander, pilot and mission specialist, and up to four payload specialists, who could be employees of whoever was paying for the individual mission, and who would operate the specific payload equipment involved.

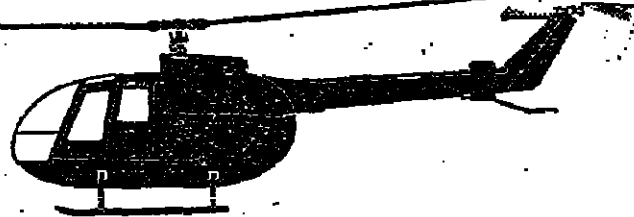
The whole concept of the Space Shuttle is so vast that the best idea of its scale can be gained from the fact that the combined Booster and Orbiter vehicle will be as large as the present-day European A-300 Airbus.

The U.S. aim with the Space Shuttle is to make it available to all free-world users who can afford to pay the costs of an individual mission. No figure has been put on this as yet, but it is likely initially to be expensive, since the U.S. can be expected to want to recoup from such rentals a good deal of its original outlays on the overall venture. Since any mission could run up to 30 days, the cost per mission could amount to millions of dollars. For this reason, it seems likely that the conventional rocket launching of simple satellites will be retained for some time, at least until the Space Shuttle is able to demonstrate that it really can reduce the cost per pound of payload deposited in Space.

But there is the possibility that the U.S., under pressure of demand from its own users, and perhaps also for political reasons, will not be able to make the Shuttle as freely available to others as it now suggests it intends to do.

For these reasons, the European Space Agency on this side of the Atlantic is developing its own conventional rocket launcher system for putting unmanned satellites and other payloads into space, the Ariane, which will be launched from the Equatorial launching base in Guyana, owned by France which is a member of the ESA. The Guyana site is now being extensively refurbished for the Ariane, and it is expected that the first test-launch of this vehicle will take place around 1980.

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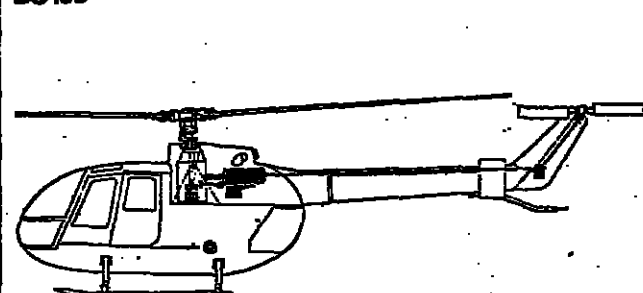
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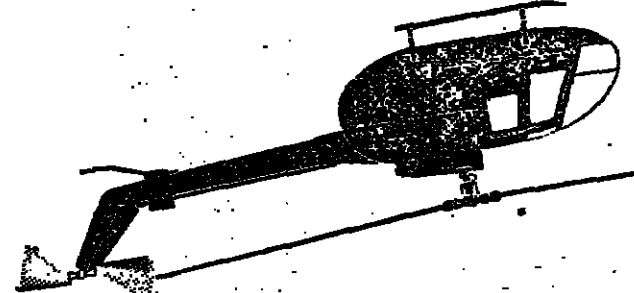
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BO105

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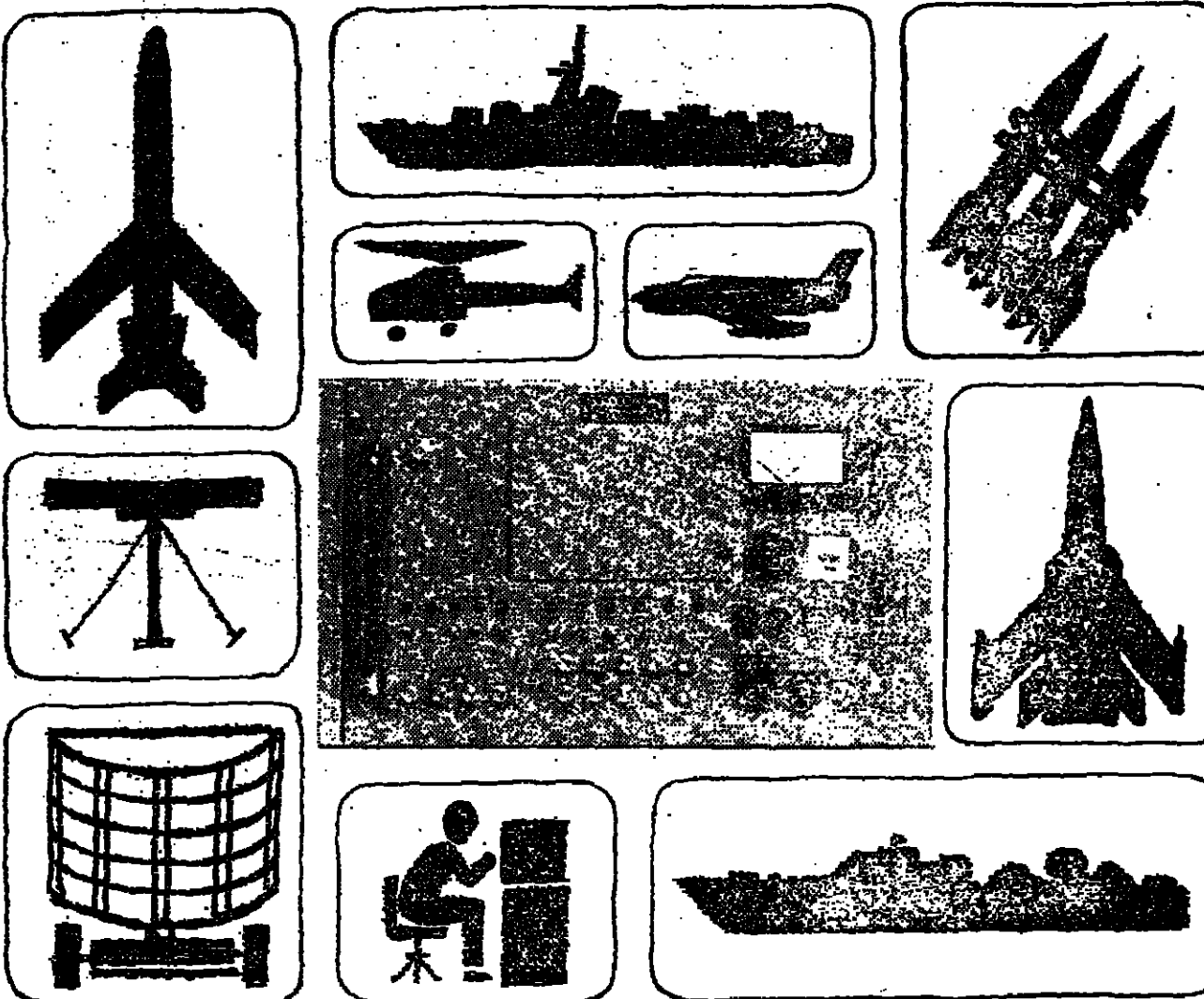
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Cargo

CONTINUED FROM PREVIOUS PAGE

It is this, perhaps more than any other feature, that makes the BA scheme of such consequence for, by applying the same rate to all types of commodities shipped under contract, the airline is virtually introducing what is known in industry jargon as a "freight all-kinds" (F.A.K.) rate, and thereby abolishing at a stroke the thousands of special commodity rates which form the backbone of the IATA rate structure and are the bane of forwarders and shippers alike. For years forwarders and shippers have been pleading with the IATA carriers to substitute commodity rates with a F.A.K. rate, and although some of the bigger airlines have been in favour of it, attempts to reach agreement on the issue have always been rejected when the unanimous decision has been sought at successive IATA cargo rates conferences.

The schemes will operate only on services from the U.K. to points in the U.S. The airline has selected the North Atlantic route as the testing ground for

two reasons—first, because more cargo traffic moves on the route than on any other, and secondly, because at the present time an "open rate" situation is in existence on the route and this effectively enables airlines operating on it to set their own rates, subject only to the approval of their own governments. In the case of the North Atlantic route, however, the U.S. Civil Aeronautics Board (CAB) insists on being consulted when rate changes are proposed, regardless of whether or not an open rate prevails.

The U.K. Civil Aviation Authority (CAA) has already given its approval for British Airways to go ahead and put its contract rates into effect, which it planned to do on September 1. If the U.S. Civil Aeronautics Board rejects the rates—and considerable pressure was being exerted upon it to do so by the four American carriers operating on the route, Seaboard, Pan Am, TWA and National—then a delicate situation could arise.

In the face of a CAB rejection the CAA would have to decide

to issue a directive to BA to apply the rates, or bow to the Board's objections. If it did so it would come under severe criticism from the British Shippers' Council and other trade organisations as well as from the majority of the U.K.'s air forwarders, most of whom have already signed letters of intent agreeing to enter into contracts with the airline as soon as its rates come into effect.

But whatever the outcome on the North Atlantic, now that British Airways has shown its hand it seems clear that the airline will seek to introduce contract rates on other routes. One of the first might be to Hong Kong which, being a cabotage route, is free from all government controls when it comes to rates.

Once that happens it will be only a matter of time before other airlines fall into line with the concept, and contract rates will become the order of the day on all the air routes of the world.

Peter Hering

M.D.

Equipment suppliers kept busy

THOUGH the past year or so brought a decline in the fortunes of many of the air transport organisations as a result of world recession, a number of secondary though still important factors have kept most of the supporting industries on their toes. These factors derive mainly from the constant search for increased safety, closer attention to environmental effects, better economy and a trend towards unification of operational procedures within areas such as the EEC.

Pressure on supporting industries is unlikely to diminish, however, as their current projects come to fruition since—even disregarding the military market—something like 18,000 machines will be added to the aircraft population within the Common Market countries alone over the next ten years. Existing overcrowded or inadequate facilities will clearly become more overcrowded or inadequate and there will be growing pressure on the civil aviation authorities all over Europe for improvements in traffic control, radar surveillance and so on, apart from the pressing need to provide an all-round improvement in the power and capabilities of the on-board equipment of the light aircraft.

Of the latter, according to Frost and Sullivan, some 13,700 new units will appear in European skies between now and 1986.

During the same period, the European airlines will add no more than around 190 large transports to their fleets.

That is not to say that the work being carried out, for instance, Category II/IIIA "blind" landing by British Airways in conjunction with RAE and Smiths Industries, is of little importance insofar as smaller aircraft are concerned. But this, like airborne collision avoidance systems, is pioneering work and although blind landing paid off handsomely for the European Division of British Airways last year, particularly in November, when Tridents

were practically the only aircraft able to operate into appropriately equipped airports for several days at a stretch, it is going to take a great deal of time, sophisticated electronic engineering and endless international argument before the smaller transports, let alone the light plane, are equipped with the necessary black boxes for landing in poor visibility.

Nevertheless, there is a great deal of activity in improved, though still simple, landing systems for fitting to light aircraft and helicopters, the Philips organisation being one of the main contenders in this area. Growing interest is being experienced for small weather radars with ranges of around 200 nm, particularly now that the use of digital computer techniques is providing a clearer display of conditions ahead than hitherto possible.

But all the foregoing applies to aircraft in flight and, as Constance Babington Smith of buzz-bomb fame pointed out in her biography of Amy Johnson, "the whole art of flying is to come down to land again." And one might add: "... after having got off safely."

Testing

As in blind landing, Britain has taken a world lead in the rapid and advanced testing of aircraft tyres, wheels, and complete undercarriage and braking systems. Dunlop's Aviation Division is operating a unique high-speed dynamometer able to cope with applied tyre loads of up to 100,000 lbs and simulate take-off accelerations from rest to as much as 335 mph.

Installed at Fort Dunlop, this computerised unit can simulate aircraft inertia and perform any cycle of tests with tyre assemblies running at varying angles of steer, camber, or both. The forces working on the tyre immediately and displayed and recorded through the attached computer.

It is interesting to record that, in this instance, as in the

case of the Concorde long-term fatigue testing rig whose complex computer control programmes were developed by CAP in Britain, more advanced use is being made of the power of electronic data processing to solve difficult industrial problems than anywhere else, despite the prodigious application of computers in the U.S. Space programmes.

Apart from the mechanical testing of tyres and landing gear components, Dunlop development teams have had to get themselves involved in a great deal of basic or near-basic work on the heat-treatment and sintering of metals, vacuum processing of alloys and the investigation and application of new materials, of which the Concorde's carbon brake is just one example. Indeed, a company able to cope with such a difficult material as beryllium and turn this extremely light but particularly intractable metal into reliable brake components for Trident and Concorde has already solved some of the most difficult problems that the modern metallurgist could be called on to tackle.

To play an international role in this particularly exacting industry a company not only has to spend heavily on research and development, but make an inspired choice of subjects for major programmes. Dunlop's international clients include McDonnell-Douglas, Aerospatiale, Dassault, de Havilland, Dornier, Fokker, Fiat, Kawasaki and Saab, among others.

Much has been written over the past ten years on the need to make the pilot's role less complex while simplifying the actual control device layout and making it less vulnerable to damage or failures.

It has fallen to another British company, Marconi-Elliott Avionic Systems, to score a world first in controlling an aircraft by means of highly automated equipment based on a series of tiny computers. In this, all the information flowing between flight deck and control surfaces is in the form of a

stream of binary coded impulses rather than a varying potential as hitherto.

The problem of complete electrical isolation of the various components of the control network has been given a particularly neat solution which consists in turning the electrical pulses into flashes of light which are carried from flight deck to controls and vice versa along "light pipes," bundles of continuous optical fibres, and turned back into electrical pulses at the receiving end.

Contracts

The aircraft for which the flight control system has been developed is the Boeing contender for the massive contracts expected to be placed by the U.S. Air Force on completion of its AMST advanced medium short take off and landing transport investigation. The Boeing machine is the YC-14 and by the time Farnborough is under way, it should have begun to yield some information on the power lift concept it embodies to get it off the ground in 2,000 feet at 110 kt.

The Marconi equipment is expected to improve performance and handling qualities of the aircraft, sensing aircraft motions and pilot commands and handling the corresponding data streams through a trebled computer system to provide automatic positioning of the control surfaces and adjustment of engine thrust in line with flight commands. It is unique in transport aircraft and though still a long way from fully automated digital control of an aeroplane, represents a major step towards transferring the routine jobs in flying to computers.

So far as the man in the street is concerned, this is probably the most important development Marconi will be showing. Alongside it are six entirely new avionics systems, five for military work and one for both civil and military operations. The latter is a ground proximity warning device which

has already been ordered by Laker and British Midland.

The military developments include new versions of the Head Up Display (HUD) equipment pioneered some ten years ago by Elliott-Automation and now developed into an ingredient of what is probably the most sophisticated weaponry by Marconi-Elliott.

Before leaving the topic of automation—the HUD devices rely on tiny computers to automate the job of watching controls while keeping an eye on the target—work on providing digital engine controls for Concorde must be mentioned. At Fairford, Concorde 202 has been fitted with a Lucas Aerospace GPDC (for general purpose digital control unit) on one of its Olympus engines.

This equipment will control fuel flow and jet efflux nozzle at the outset of the programme. It can also handle variable intake geometry, reheat and noise abatement procedures.

Important in the acronym for these units are the letters GP: general purpose. They imply that whatever changes are made to the engine, or when the units are applied to different engines, all that has to be done is to alter the control programme in the system's electronic logic. This contrasts with the extensive physical changes that have to be made to today's mechanical controllers.

All the main components for the GPDC go into a single IATR long box and include a compact computer. Thus the rapid advances in electronic engineering of the last two years are making the avionics designer's task that much simpler. But inspired systems work is the key.

Communications in the widest sense are a further essential ingredient of flight technology and Plessey this year is stressing the development work it has done on airborne communications equipment for the world market and displaying



The Marconi-Elliott computerised automatic map reader (AMR). This continuously computes and displays the position of the aircraft, by dead reckoning using data inserted by the pilot.

two new transceivers, one for the DMLS now being shown publicly in its ground and airborne equipment forms for the first time. DMLS, for Doppler Microwave Landing Systems, is being assessed alongside other systems by the All Weather Operations Panel of ICAO which is intended to be used for the next several decades all over the world.

Several possible techniques were studied before the U.K. have been engaged in such authority chose doppler methods pioneering projects as the

Harrier, Tornado, Concorde the RB-211, there is a wealth of manufacturing and development experience to draw on and even when a project failed to meet the schedule, all is not lost. In instance, carbon fibre problems are understood to have been mastered at last and a new generation of engine units of immense strength to weight ratios may soon be waiting in the wings.

Ted Schoete



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U.S. industry sees fortunes revive

AFTER two years during which most sections of the U.S. aerospace industry have been beset with fears of falling profits and failure, the past 12 months have seen a sudden revival in the industry's fortunes. Indeed, some of the best known companies in both the construction of aircraft and their operation have been among the best performing shares on the U.S. stock markets.

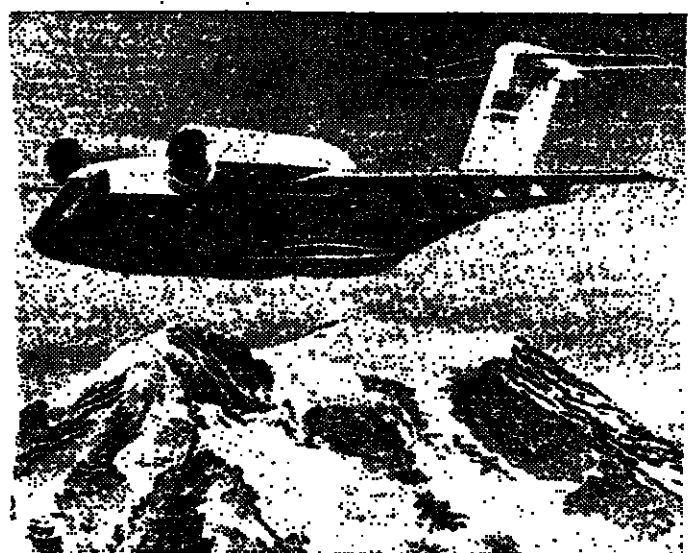
Even Lockheed, saddled with the burden of the TriStar, and for so long the industry's lamest duck, is now beginning to emerge from the grip of its bankers and to forecast a steady improvement in its underlying business. The latest decision by British Airways to buy more TriStars will be another factor supporting the company.

As with Lockheed and other aircraft manufacturers, one of the principal factors which explain the improving outlook has been the evidence of increasing profitability from military contracts.

Military spending accounts for around 80 per cent. of the U.S. aerospace industry's output and it was the decline in this spending which contributed so much to the industry's difficulties. With political concern about the U.S. defence capability growing and new programmes approaching production, defence spending is forecast to increase—and with it the profits of the manufacturers.

Just how firmly based this recovery in military outlays will prove cannot be confidently predicted and some projected developments, notably the new B-1 bomber which could prove to be the most costly military programme in history, has yet to be finally approved.

There are indications that its approval could hinge on the outcome of the November presidential election. Certainly Democrat Presidential candidate Jimmy Carter has indicated that he will take a close look at the \$21bn. programme. Irrespective of the final decision on the B-1, defence spending on aerospace is destined to rise, with companies like General Dynamics, which is building the F-16, scheduled to share in the profitability of the new programmes.



The YC-14, the short takeoff and landing aircraft being developed by Boeing for the U.S. Air Force's advanced medium STOL transport programme. The aircraft made its maiden flight recently.

One problem, however, is that while there are new programmes around it is generally believed that there are not enough of them to ensure that the industry's capacity is fully utilised. Thus there are forecasts that irrespective of the increase in military spending, the military side of the industry will have to contract.

Widespread

There is fairly widespread agreement too that commercial aircraft construction will not increase rapidly enough to fill the gap. It is abundantly clear, and has been for some time, that aircraft manufacturers were not ready to fund the development of the next generation of civil aircraft themselves.

Costs are too high, and with recent experience of demand for new aircraft falling far short of forecasts, they have become wary. Thus McDonnell-Douglas has made it clear that international co-operation with manufacturers in other countries will be needed. McDonnell-Douglas appears to be close to a co-operation

agreement with French aerospace interests, among others, and Boeing with the Japanese, although it is still far from clear that final agreements can be reached. Political factors are that much more influential when international co-operation is required.

Beyond this, however, the question remains as to just what sort of market there is for new aircraft and perhaps more crucially how the airlines in private hands are to pay for them. Most forecasts indicate that the principal market is in short-to-medium range wide-bodied jets and this is the market the manufacturers are aiming at.

By the end of the decade demand for these types is expected to materialise but meantime the private airlines have somehow got to get their operations on to a sound enough footing to be able to finance the new equipment.

In the wake of the Arab oil embargo and the rise in oil (and jet fuel) prices, the years 1974-75 were two of the worst in the U.S. aviation industry's history. In 1975 the industry lost over \$100m. as costs rose and passenger demand slumped.

The first six months have seen a phenomenal recovery in the industry's profitability, and Wall Street analysts now see the airline profits overall this year, over \$250m.

Vigorous cost-saving programmes, stabilisation of costs and higher fares—among the factors which have contributed to the recovery—needs to be noted, however, while the airlines as a group are profitable there are significant exceptions among individual airlines. Thus while Pan American and TWA have both cut their losses significantly in the first half of the year, they are still both lost money.

Argument

Increasingly the issue of fuel is seen in these circumstances as crucial to the industry's development. The argument is that if the airlines are to generate internally the cash to finance new capacity (and the profits which will enable them to tap investors for capital) they will need to have a flexible pricing control.

So far this year there have been indications that the Civil Aeronautics Board is allowing prices to rise. But the role of this regulatory agency is an issue—whether, for example, the industry should be deregulated, and if so whether it would lead to such severe competition that airlines would be driven out of business or, alternatively, to politically acceptable price increases.

This uncertainty continues to cloud the outlook for the airlines. There are those who believe, however, that while there are some major carriers which are weak financially and relatively unprofitable, the industry's regulators will not impose too strict a programme of price restraint and the industry's more profitable carriers at least will be able to build up resources to finance re-equipment. How the weaker airlines will cope with the problem of financing new aircraft remains an open question.

Stewart Fleming

AEROSPACE IX

Renewed growth for the airlines

OVER THE past few months, all the indications have been strengthening that the recession which began with the fuel crisis in the winter of 1973 is now over, and that world-wide air transport is picking up again. So far, the improvement appears to be stronger on the long-haul routes, with some of the regional short to medium-haul routes, such as in Western Europe, responding at a slower rate.

This improvement, provided it is sustained (and so far there is no reason to believe that it will not be), is likely to be welcome to the airlines for a variety of reasons, although it will also bring some major problems. In the first place, the renewed expansion is likely to be at a slower rate than that of 12 to 15 per cent, a year, historically experienced in the mid to late 1960s.

Recent studies prepared by the International Air Transport Association (IATA), covering its 111 member-airlines, have suggested that world-wide between now and 1981 the industry can expect an average annual growth rate of about 8 per cent, although the pace of economic recovery, and hence of air transport expansion, can be expected to vary widely. The biggest rate of growth is expected between Europe and the Middle East (14.3 per cent a year), with Europe, and the North Atlantic, both already mature markets, expanding only at about 5.8 per cent a year.

Secondly, this expansion will go some considerable way towards easing much of the over-capacity problem that has bedevilled the industry for the past few years, stemming from the sudden slackening of the growth rate in 1973-74 as a result of the economic recession, combined with the excessive inflow of new aircraft to the world's commercial airline fleets in the earlier part of this decade.

The airlines have tended to cope with this over-capacity in a variety of ways, such as of straight cancellations of flight

Reluctance

As a result, there is still a marked reluctance on the part of many major airlines to place orders for new equipment. This in turn has been and is causing the world's major aerospace manufacturers in Europe and North America some considerable difficulties in maintaining production lines at economic, let alone profitable, rates. It may be some time, perhaps as much as a year, before some of the major airlines in Europe and North America are convinced that the recession is really over, that their balance sheets are improving satisfactorily, and that their over-capacity situation is coming fully under control.

Only when that combination of factors occurs will they be likely seriously to consider the purchasing of new equipment.

For while the situation in air transport may be moving back into a more favourable period, there are many problems that the renewed expansion of traffic will bring.

is doubtful, for example, whether the scheduled airlines are likely to gain much financial benefit from this expansion, at least for some time to come, and certainly not until they have been able to get the rapid rise in costs of all kinds under control.

The IATA, in a financial review recently published, stressed that 1975 was another disappointing year for the world air transport industry, with the continuing recession combining with severe cost inflation to produce "a totally inadequate" financial result. Revenues of the IATA members in 1975 reached the record level of \$30bn. (out of \$27bn. for all the world's airlines), but total expenditures exceeded revenues to produce an operating loss of 1.3 per cent, or about \$400m. net on their total operations.

"This result is totally inadequate for future development of the industry," says the IATA, "but would have been worse without the subsidies and taxation concessions granted by many national administrations."

The IATA Cost Committee estimates that for IATA scheduled international services alone an additional 14 per cent increase in revenues (or about \$1.65bn.) was required in 1975 to provide funds to cover interest and other financial expenses, full taxation liabilities, and a fair return to shareholders.

The steep rises in costs of all kinds, but especially labour, air navigation and airport user charges, and in some parts of the world fuel prices also, have continued into 1976. While to some extent these increases will have been mitigated by the increased revenues earned on the rising volume of traffic, it remains doubtful whether the overall result for 1976, when it finally becomes available, will show any significant improvement.

It is against this background of financial uncertainty, however, that the world's airlines will have to face all of the problems that the renewed expansion of traffic will bring.

Contrasting

This lack of a satisfactory, uniform global system of government regulation for air transport is one of the most potent forces working against the development of a healthy, profitable air transport network. In virtually every country of the world, a different system of air transport regulation prevails, with different governments holding different, and often sharply contrasting views, on how their particular air transport systems should be run.

Mr. Knut Hammarskjöld, the director-general of IATA, has been tirelessly campaigning for some uniformity of regulation in world air transport affairs, and it is to be hoped that, much greater attention will be paid by governments to this need for standardisation of regulatory control. This would not only make the task of the world airline industry much easier, but also go a long way towards achieving the lower cost basis upon which a cheaper fares structure can be constructed.



Artist's impression of the newest member of the Lockheed TriStar family—the Dash 500—which has been ordered by British Airways for introduction into service in 1979.

But the expansion in the fuel-efficient) airliners, in period ahead will bring other problems, many of which were already evident when the recession began but which were conveniently swept out of sight under the carpet when the urgent need to deal with them disappeared. Among these are noise, and new airports.

Throughout the world, there is now a growing emphasis on the need for a new generation of quieter aircraft to meet the increasingly stringent noise regulations that governments are being forced to implement by noise-conscious communities around airports. During the period of comparative slack traffic development of the past three years, the problem of noise has not been ignored — indeed, in some countries such as the U.S., it has been tackled with considerable vigour — but the air transport industry can expect the problem to recur in an even more determined fashion now that the public at large can see that air transport itself is resurgent.

In turn, this will bring increased pressures on the airlines to phase out the older and noisier (and, incidentally, also

much before mid to late 1977 industry moves more confidently into the period of renewed growth, many cherished airport schemes which have been gathering dust will have to be brought out again and studied anew. Thus, it is possible to predict that the expansion in the air, with all that it entails in new capital financing, is likely to be matched by an equally vigorous expansion in facilities on the ground, also calling for substantial injections of cash.

Grandiose

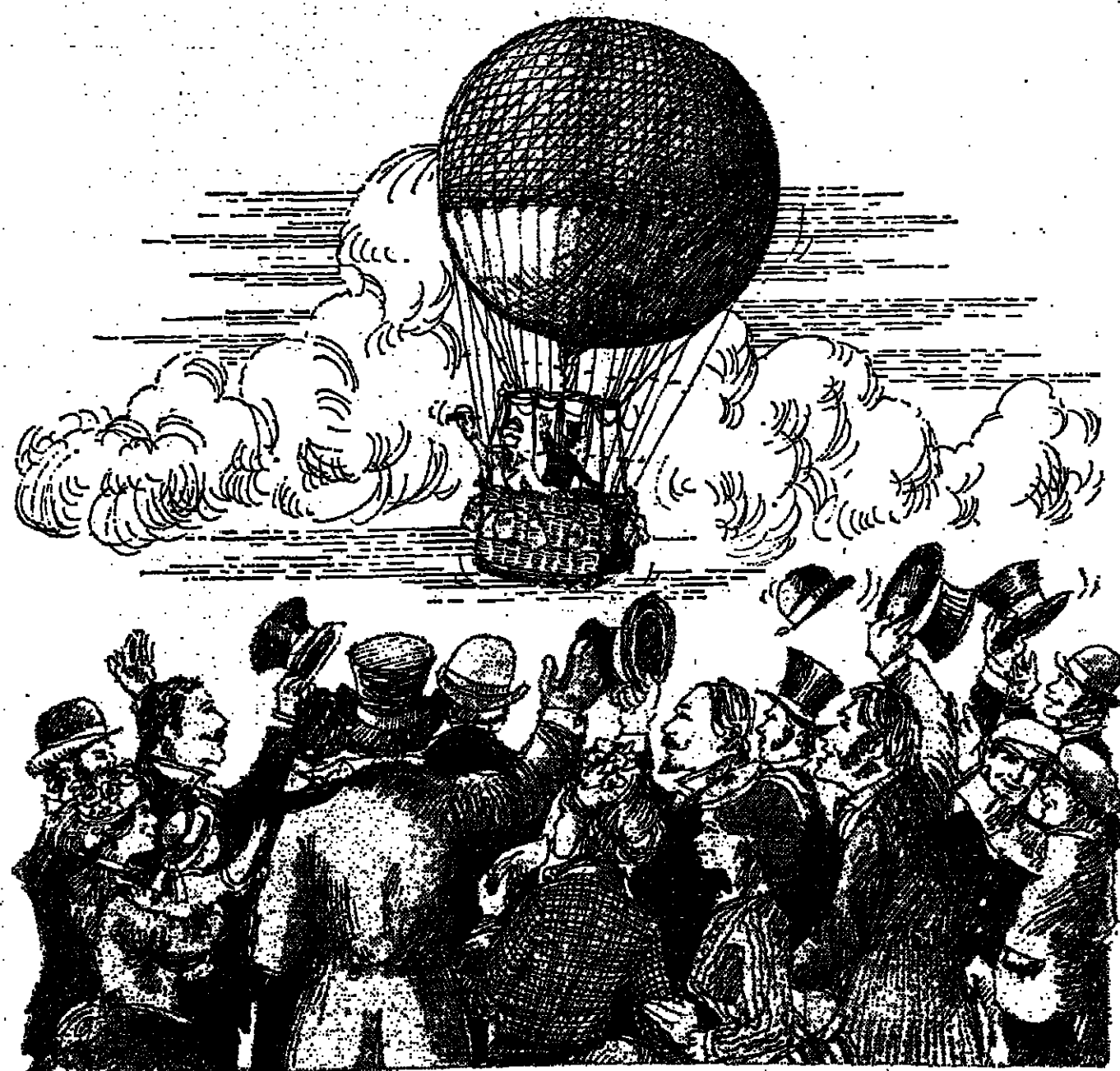
So far as the airport situation is concerned, it seems clear that in many parts of the world a serious situation will arise as existing airports, deemed adequate for the early 1970s, become inadequate for the 1980s and 1990s. In some countries, grandiose airport plans that were under way or mooted in the early 1970s were axed when the recession struck, and some governments clearly have been hoping that they need not be revived.

The fact is, however, that although at many airports there may be adequate runway capacity (especially if the trend towards the use of bigger wide-body aircraft, each capable of carrying more passengers, is maintained), there will be a serious inadequacy of terminal capacity, resulting in congested passenger handling facilities on the ground. Thus, as the recession fades, and the air transport

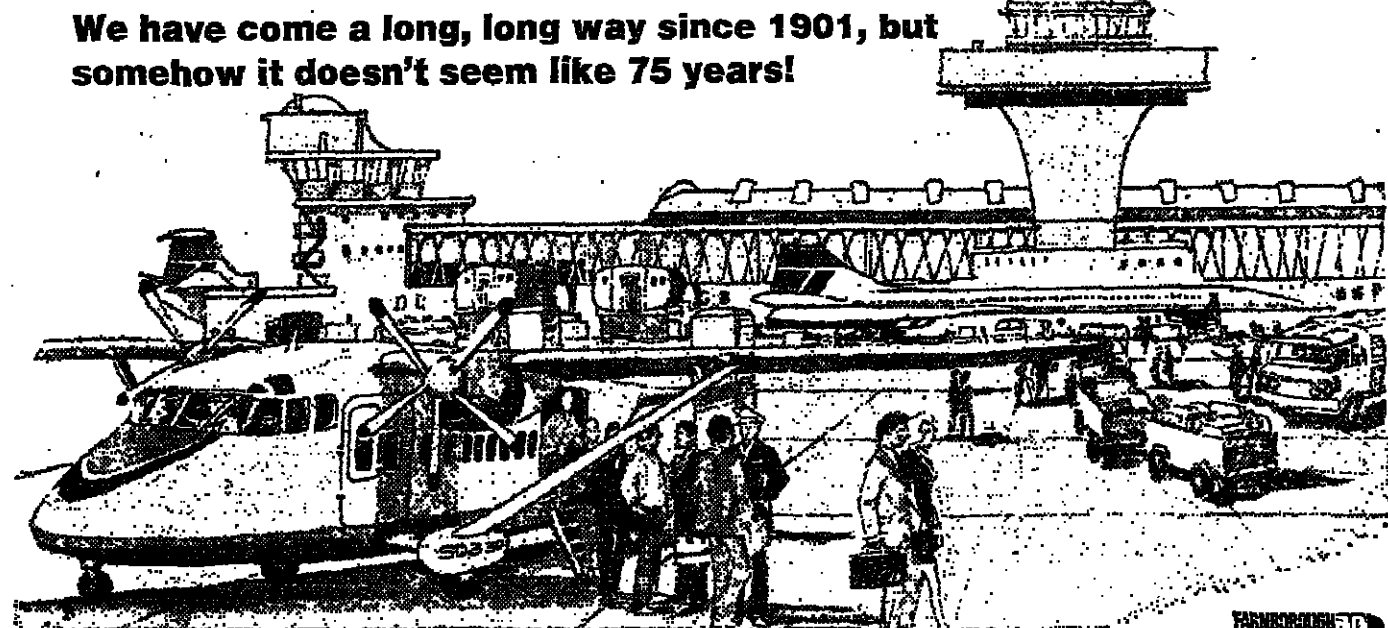
M.D.

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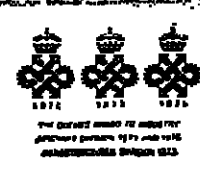
It was 1901 — Queen Victoria had died in January; Edward VII opened his first parliament; the Boer War was in its second year; they were digging for gold in the Klondyke; the Trans-Siberian Railway opened; and the Short brothers set up a workshop in Hove for the manufacture of aerial balloons and began making some history of their own:



Like winning the UK's first aircraft production contract — from the Wright brothers themselves;
Like building the first British aircraft to fly a circular mile,
And the first to take off from the deck of a ship underway,
And the first to carry a torpedo.
Like producing the world's first all-metal, stressed-skin aeroplane and setting a standard in aircraft design for years to come.
Like introducing a new conception of comfort to civil aviation with the big C-class flying boats.
Like producing the RAF's first monoplane four-engined heavy bomber.
Like winning the UK's first post-war export contract for aircraft,
And developing the world's first fixed-wing VTOL aeroplane,
And the RAF's biggest freighter,
And the world's largest light aircraft,
And the most widely used ship-to-air missile,
And Britain's first shoulder-launched guided weapon,
And the first ever wide-bodied commuter airliner.
As well as becoming Europe's leading specialist in jet engine podding and establishing a tradition of international co-operation by the production of major components for great aircraft like the Boeing 747, the Lockheed TriStar and the Fokker F.28.
We have come a long, long way since 1901, but somehow it doesn't seem like 75 years!



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AEROSPACE X

RAF in tight trim

THE PRIMARY concern of the RAF today is to ensure that despite the substantial cuts in its budget stemming from the Defence Review of 1974 and the subsequent Government's public expenditure reviews of 1975 and this year, it can continue to provide a first-class fighting force capable of fulfilling all the commitments imposed upon it by U.K. defence policy.

The task is not an easy one. The latest financial cuts, coming after a long period of persistent whittling away of the RAF's budget, and hence also its manpower and aircraft strength, have already resulted in substantial changes in the size and composition of the fixed-wing transport force, reductions in the size of the Nimrod maritime reconnaissance force and the future support helicopter force, and a reduction of up to one third in planned rate of deliveries of the Tornado Multi-Role Combat Aircraft (MRCA).

The air transport force has now been reduced by about half, and all Comets and Britannias withdrawn from service. The size of the helicopter support force has been reduced, partly by disbanding the Wessex squadron in Singapore, and further reductions in the support helicopters and the maritime force are related to continuing commitments in the Mediterranean.

In addition to these changes, further detailed studies of the long-term air transport task, as a result of the need to save money and also because of changing commitments, have shown that the long-term overall size of the RAF transport force remains adequate, but that a more economic use of resources can be achieved by increasing the numbers of VC-10s and Hercules aircraft in the front-line, and disbanding the Belfast force.

At the same time, considerable savings are being found in the support area, involving reductions in spares and engineering support, communications and radars, and works expenditure. Also, in continuation of the policy of reducing support costs to the minimum, the plans for the merger of Training and Support Commands

will be completed during 1977. When this merger is completed, the RAF Command structure in the course of a decade from eight Commands to two, with substantial savings in personnel and administrative costs, while the size of the RAF overall will have been reduced from a total of 113,000 personnel at April 1, 1970, to around 87,000 at April 1, 1977.

It has been made clear to the Government in the strongest terms that defence spending overall has now virtually been pared to the bone, and that any further reductions for economic or political purposes can only be achieved at the expense of cuts in commitments, including those to Nato.

That this possibility of further spending cuts is fundamentally undesirable has been made plain repeatedly by the former Chief of the Air Staff, Sir Andrew Humphrey (who is now the Chief of the Defence Staff, and who, therefore, can be expected to reiterate this theme in future on behalf of all three armed services). Sir Andrew has drawn attention to the continued substantial build-up of Soviet conventional forces, including air-power, and especially in that most important of theatres, the European Central Region of NATO.

Damage

Sir Andrew has said that the Soviet Union each year is building 1,800 military aircraft—enough to replace our whole front line every six months or so—of which over half are high-performance combat aircraft. "Russia is spending more on military research and development than the whole of the Western world put together. So we must expect in the future to be faced not only with forces of increasing strength and of increasing capability, but also almost probably by some alarming technological achievements. . . . We are just at the beginning of an era of extremely accurate air-delivered weapons, which will make it possible for some tens of aircraft to do the same damage that would have previously required 1,000 air-

craft. It is of the greatest importance that we put a lot of effort into strengthening our air defence."

While the battle to prevent further cuts in spending continues, however, on the equipment side some substantial progress is being made in developing new aircraft for the future. The production contracts for the Anglo-West German-Italian Tornado Multi-Role Combat Aircraft have now been signed. Out of an ultimate total of 809 aircraft for those three countries, the RAF is destined to get 385, of which 165 will be the specialised Air Defence Variant for the air defence of Great Britain, while the remainder will be of the basic version for a wide range of roles, including battlefield support and air superiority, tactical strike by both land and sea, and interdiction (the destruction of the enemies' support installations behind the lines).

Each Tornado will cost around £5.5m. in the basic version and £6.5m. in the Air Defence Variant. Work on the development programme has been under way for some years, with eight of the nine prototypes now flying, while six pre-production aircraft are also being built.

The Tornado is a twin-engine, two-seat, supersonic swing-wing combat aircraft, and in the RAF it will progressively replace five aircraft types—the ageing Canberras, Buccaneers, Vulcan bombers and Lightning fighters, and supplement and eventually also replace the Phantom combat aircraft. The RAF sees the Tornado fulfilling the bulk of its front-line combat needs through to the 1990s.

At the same time, work is now gathering momentum of the eventual replacement of the Jaguar jet strike-trainer and the Harrier vertical take-off fighter. Currently, the aim is to try to find one common type that can replace both these aircraft, in the close-support and battle-field air superiority roles. To this end, a combined Air Staff Target paper has been written, called AST 403, and this is now being studied in the aerospace industry to enable the military aircraft manufacturers to come up with their preliminary ideas

as to how the Air Staff's needs can be met. As yet, AST 403 is little more than a concept—a list of requirements as to flying and fighting performance capabilities—out of which the aerospace industry can shape a possible aeroplane.

The discussions about AST 403 are likely to continue for many months. The possibility of international collaboration on this programme has already been raised since it is likely that other members of NATO will also have a requirement for a similar aeroplane in the mid to late 1980s, in which case, a joint development and production venture could become feasible.

Programme

The preliminary RAF requirement would appear to be not less than 300 aeroplanes (replacing 200 Jaguars and 111 Harriers), while the French Air Force, which also has 200 Jaguars, may need a similar number of replacements for that aircraft. Even discounting any possible West German or Italian requirements, therefore, a major programme for over 600 aircraft appears to be shaping up, and it seems likely that the eventual Jaguar-Harrier replacement could become a military programme of major significance in NATO, rivaling that of the Tornado itself.

Also looking ahead, the RAF is expected to get this year the first of its new generation of light combat/strike aircraft, the Hawker Siddeley Hawk, of which it has 175 on order. This jet trainer (which is also being offered to overseas air forces both as a trainer and a possible light combat aircraft), will be used to train pilots to fly fast jets, and will replace the ageing Gnats and Hunters now in service.

A major Nato study is also now in progress to find what is called an "Airborne Warning and Control System (AWACS)" aircraft, which would be always airborne in sufficient numbers to enable early warning to be given of enemy attack along the entire frontier of Nato from the North Cape of Norway to the Eastern Mediterranean. This is a formidable requirement, requiring a highly specialised and therefore expensive aeroplane.

Two possibilities exist. One is to buy the Boeing E-3A aircraft which has already been developed for this purpose and which is now on order for the U.S. Air Force. A Nato procurement of about 32 aircraft, worth in all more than \$4bn. (over £2.3bn.), has been under discussion for some time, but although some countries, such

as West Germany, are believed to favour Boeing, no decision seems likely before the latter part of this year.

A second possibility would be to modify the existing RAF Hawker Siddeley Nimrod maritime patrol aircraft for the AWACS task. This procurement decision is of considerable importance to the RAF, since it would be required to operate the Victor Mark 2 aircraft to the air-to-air refuelling role, and a programme to extend the life of the Hercules transport by replacing the centre section of the wing.

In addition, a major programme of new guided weapons development is in progress. This includes a new medium air-to-air missile, the XJ-531 Sky Flash, based on the American Sparrow missile, which it will eventually succeed in RAF service. Initial development work



A Jaguar of the RAF photographic reconnaissance squadrons in service with Nato.

ing and attacking submarines, has begun on a number of air-to-surface weapons, designed to increase the effectiveness of the Buccaneer fighter, the fit-

ting of laser-ranging and marked-target seeking equipment to both the Harrier and Jaguar which will greatly improve their target acquisition capabilities and accuracy of weapons delivery, the conversion of the Victor Mark 2 aircraft to the air-to-air refuelling role, and a programme to extend the life of the Hercules transport by replacing the centre section of the wing.

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M.D.

Big market for helicopters

aircraft—that is, machines with a gross take-off weight of less than 5 tonnes apiece. At least 10,500 of the military aircraft, and about 11,000 of the civil aircraft, would be likely to be in this category.

Spearheading the moves into the future are a number of major U.S. and European programmes, primarily military but with civilian markets also in view. In the U.S., several competitors—notably that from the U.S. Army for the Utility Tactical Transport Aircraft System (UTTAS) and the Advanced Attack Helicopter (AAH), and the U.S. Navy's LAMPS programme for a light ship-borne multi-purpose helicopter—have already spawned a number of new designs.

Deliveries

These include the Boeing Vertol twin-engine 20-seat YUH-61A and the Sikorsky YUH-60A 20-29 passenger helicopters in the UTTAS programme, with civil versions already envisaged, (the Boeing Vertol 179 and Sikorsky S-78), and the Bell YAH-63 and Hughes YAH-64 twin-engine 12-seat civil helicopter, while Bell is now working on its Model 232 light twin-engine commercial helicopter, designed to carry six to ten people, with first deliveries of both aircraft expected in 1978.

In Europe, Aerospatiale is offering the ten-seat SA-360 Dauphin single-engine helicopter, with a twin-engine version, the SA-365, while the company is also working on the SA-350 Ecureuil, a single-engine 5-6 seat helicopter which is due for certification by the end of next

year. MBB of West Germany won for six aircraft from the Royal Netherlands Navy for search and rescue duties, with ten more at an increased weight for the anti-submarine role.

Westland says that development of the Lynx to carry increased payloads is important because of the demands made to carry more electronics by export customers without penalties in fuel capacity. The Lynx, for example, is the basis of the Westland submission to the German Navy, and to the U.S. Navy for the latter's "LAMPS" programme for a shipborne helicopter.

Dormant

Also as part of the development of the Lynx, Westland has just flown a version of the air-SA-331 Super Puma—a new craft with the Pratt & Whitney engines (Canada) PT6-34 engines. This development has been undertaken in support of the civil version of the Lynx (the Westland 606) programme which, although at this time dormant from a marketing point of view, is nonetheless continuing as a private venture in engineering development with a view to possible future civil markets.

In addition to the Lynx, Westland has the Sea King anti-submarine and search and rescue helicopter, of which 156 have been ordered, with 128 delivered so far. Derivatives of this big helicopter include the Westland Commando transport model, of which 32 have been ordered and 28 delivered, including several to Egypt.

As with civil fixed-wing aircraft and engines, helicopters have been deeply involved in international collaboration over recent years, following the 1967 Anglo-French agreement of the development of the Gazelle light helicopter, the Puma tactical transport aircraft and the multi-role Lynx. In 1974, the asso-

ciation between Westland and Aerospatiale of France resulted in the signing of a business agreement which defined the rules for future collaboration on a commercial basis rather than on government-initiated programmes.

In 1975 a memorandum of understanding was signed by the two companies, and by Messerschmitt-Bölkow-Höbm of West Germany and Agusta in Italy, as the other two major European helicopter manufacturers, defining the basis for a four-country, four-company industrial collaboration in helicopter research, design, development and manufacture. Both the 1974 and 1975 agreements have already produced results. Westland is in collaboration with

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Lockheed to build a new long-range TriStar.

After many months of evaluation, British Airways has chosen a new model of the Lockheed L-1011 TriStar for its longer routes. Called the Dash 500, it goes into service in 1979.

In making its decision, British Airways had more than two years of experience in operating a shorter-range model of TriStar. That model has not only been the world's most reliable* big jet for 35 consecutive months, it also is the quietest, as certificated by the U.S. Government.

The new model adds almost 2000 miles to the range of TriStar. It means passengers will be able to enjoy TriStar reliability and comfort on nonstop routes such as London-Los Angeles, Sydney-Hong Kong and Buenos Aires-New York. The long-range TriStar will be powered by three Rolls-Royce RB.211-524 engines, each with a thrust of 50,000 pounds.

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*Based on airline statistics covering all big wide-body jets. The statistics, which record mechanical delays and flight cancellations, reflect the ability of TriStar to operate on schedule.

AEROSPACE XII

French co-operation is widespread

THE FRENCH Government's position of France's European decision earlier this month to partners, it is understandable give the green light for the that the British aircraft industry would not be satisfied with development of a new medium-range airliner, the Mercure 200, if it did not have any other manufacturers and McDonnell-Douglas of the U.S. has dispelled some of the gloom about the industry's future.

Though it poses almost as many problems as it has solved, no more than the go-ahead in principle has been given and the detailed financial and industrial terms for the joint venture have yet to be negotiated—it has at least cleared the air as to French intentions.

With sales of Concorde unlikely to exceed the nine already sold, the prospect of China and Iran placing firm orders for the supersonic aircraft appear to have faded almost completely. Britain about the ability of the and European Airbus orders unlikely to maintain their initial momentum, the industry desperately needed a shot in the arm.

Such a boost could only be given by a major civil aircraft project and it has long been the conventional wisdom on both sides of the Channel that this was viable only in co-operation with a U.S. manufacturer in order to compete on the vital American market. The initial reaction from France's prospective European partners has been hostile, mainly because the decision was unilateral and because the announcement came before they themselves had taken any decisions. But they could hardly have been taken completely by surprise, since the project has long been the subject of negotiations within the so-called "Group of Seven", which includes the British Aircraft Corporation, Hawker - Siddeley Aviation, Messerschmitt - Bölkow - Blohm, Dornier, VFW-Fokker, Aerospatiale and Dassault-Breguet.

These negotiations, according to highly reliable sources in Paris, had even reached the stage at which the British aircraft industry was offered a 20 per cent. stake in the Mercure 200 project, which would probably mean that it would build the wings, as Hawker-Siddeley is already doing in a private capacity for the Airbus A-300. Though this would amount to half the total proposed partici-

Confident

Be that as it may, the French remain confident that Britain will come into one or other of the European projects. But they have so far kept very quiet about their future plans for the Airbus and it is difficult to say at the moment whether British fears concerning the French Government's reluctance to finance two major new projects will turn out to be justified. Certainly, further clarification of French intentions is required before the other members of the "Group of Seven" can make up their minds about their own attitude, since what has been announced so far amounts to only the bare bones of a joint venture.

As things stand, Aerospatiale, the French State-owned aircraft manufacturer, has been awarded the lion's share of 40 per cent. in the new Mercure 200 project; McDonnell-Douglas, which will build the aircraft in the U.S., 15 per cent.; and Dassault-Breguet, the privately-owned



The Dassault-Breguet Mercure 100, of which a derivative—the Mercure 200—has been proposed by the French Government as an international programme for the future.

French company, a surprisingly low 5 per cent., with the remaining 40 per cent. shared out between various European partners.

Aerospatiale, which has been obliged to give up its own plans for co-operation with Boeing, has won the consolation prize of building the airframe at its Toulouse plant. But Dassault-Breguet, the constructors of the commercially unsuccessful Mercure 100 from which the new aircraft is derived, retains the design leadership, a fact which has upset the Left-wing unions at Aerospatiale, many of whose own designers are likely to find themselves without jobs.

The engine, too, is a joint Franco-American venture. The Mercure 200, a narrow-body jet which will be capable of carrying about 180 passengers over ranges of more than 1,700 miles, will be powered by two of the new 10-tonne CFM-56 jets developed by General Electric of the U.S. and the French State-owned SNECMA engines, which are reputed for their quietness.

All this, the French Government has emphasised, is no more than a decision in principle and conditional on the negotiation of detailed contracts between the various companies

concerned. Indeed, no one is in any doubt that the hurdles which still remain to be cleared before the project materialises are considerable.

Two major problems still remain to be solved. One is finance and the other what McDonnell-Douglas intends to do about its other projects which could undermine the sales prospects of the Mercure 200.

The French Government is understood to have attached a very important condition to its own financial contribution, making it dependent on a substantial financial commitment by the American partner in the project. Some doubts have already been expressed by commentators in France about whether McDonnell-Douglas is really prepared—or able—to dig as deeply into its pockets as the French Government seems to expect. From the purely financial point of view Boeing would have been a better partner.

Secondly, the French Government appears to want the U.S. company to give an undertaking that it will not go ahead with any new aircraft which would compete on the world's markets with the European Airbus, in which Aerospatiale is also the major partner. On the face of it, it seems highly improbable

space industry is concerned, the attitude towards the Concorde announcement came none too soon. True, as a whole it has not been doing too badly. Global consolidated turnover in 1975 totalled Frs.15.5bn. (about £1.7bn.), up by nearly 20 per cent. on 1974 (6 per cent. at constant exchange rates). Exports too have risen from Frs.5.3bn. to Frs.7bn. over the same period, while foreign orders were down only slightly from Frs.10.4bn. in 1974, an exceptionally good year, to Frs.9.2bn.

Derivative

But these satisfactory figures were due mainly to military aerospace sales which, according to the latest statistics, make up more than half of France's total arms sales. Dassault, whose highly successful Mirage family continues to ensure its viability and whose delta-winged derivative of the Mirage III, the 2000, has aroused strong interest among potential purchasers, particularly in the Middle East, is still in a relatively favourable position. Aerospatiale, on the other hand, has registered its fourth successive annual loss—Fr.457m. (£54m.) in 1975—much of which can be put down to the funds it has sunk into Concorde and Airbus.

Indeed, if the aerospace industry were run on strictly business lines, France would long ago have concentrated entirely on military aircraft, helicopters and aerial missiles. But, as in the case of the U.K., political considerations are all-important. France, like the U.K., wants to remain a major civil aircraft manufacturer. Its

Robert Maun

Paris Correspondent

Lags in Soviet civil development

THE BIG question hanging over the Soviet aviation industry this autumn is what has happened to the Tu-144, the Concorde of the East. This Soviet supersonic transport was to have started regular internal passenger services during the summer, following the inauguration of twice weekly cargo flights between Moscow and Alma Ata last Christmas.

Since May, however, there has been no word about plans for the airliner, reinforcing beliefs in the West that the Russians are still encountering difficulties.

These most likely centre on excessive fuel consumption (which may explain why its first route, to Alma Ata, is only 2,000 miles) and vibration. It is impossible to be certain, however, since the aircraft has been kept well away from Western eyes for some months. The only indication that plans are still moving forward was the announcement in mid-summer that Aeroflot would be the same as sub-sonic, in the true egalitarian spirit.

The Russians have also cautiously begun to enter the controversy over supersonic flight by producing evidence to show that its effects on the environment, particularly to the ozone layer, are minimal. They have not, however, said anything about noise, or commented publicly on Concorde, though in private they naturally welcome its growing acceptance.

Shrouded

But important though the Tu-144 is to the Russians for technological and prestige reasons, it is only a small part of what is probably the largest national aircraft industry in the world (most of it shrouded in secrecy and very few figures available).

Production of military aircraft has reached impressive, and from the West's point of view, worrying levels. The new generation of MiG 25s, now being widely deployed in Central Europe along with the MiG 23, has greatly strengthened the Warsaw Pact's fighter/interceptor capability. The Su-19 "Fencer" variable wing fighter bomber is rated alongside the American F-111, while the Backfire bomber, with its range and armaments, is classified by the West as a major strategic weapon.

Production of military aircraft is believed to be running at well over 1,000 a year, mainly of swing-wing tactical types. But despite the industry's advances, many of these aircraft are variations of long-standing models rather than completely new types. The "Fitter", for instance, is the only known instance in world

PRINCIPAL SOVIET CIVIL AIRCRAFT

	speed (mph)	range (statute miles)	maximum capacity (passengers)
In service:			
Tu-144 (SST) ...	1,430	4,000	140
Il-62M ...	540	6,600	198
Il-76 (cargo) ...	520	3,500	40 tons
Tu-154 ...	605	1,500	164
Yak-40 ...	290	1,118	40
Tu-134A ...	520	1,500	76-80
Due for introduction:			
Yak-42 ...	540	1,118	100-120
Il-86 (airbus) ...	600	1,000	350
An-28 (turboprop) ...	220	650	15

The neat 40-seat Yak 40, on which Russians pinned high hopes because of its undoubted versatility, has achieved only small success mainly to Italy.

The problem is of reputation. Soviet aviation is still viewed with suspicion, especially when entrusting one's life. But it is also one of the performance and the sum of most Soviet aircraft are below expectations. (There have been reports of disast among the East European lines: the Poles have indicated their intention of equipping the national Lot with U.S. aircraft.) The Russians have also been unlucky with their late duct, the Tu-154. A crash is known to have crashed in the short time they been in operation.

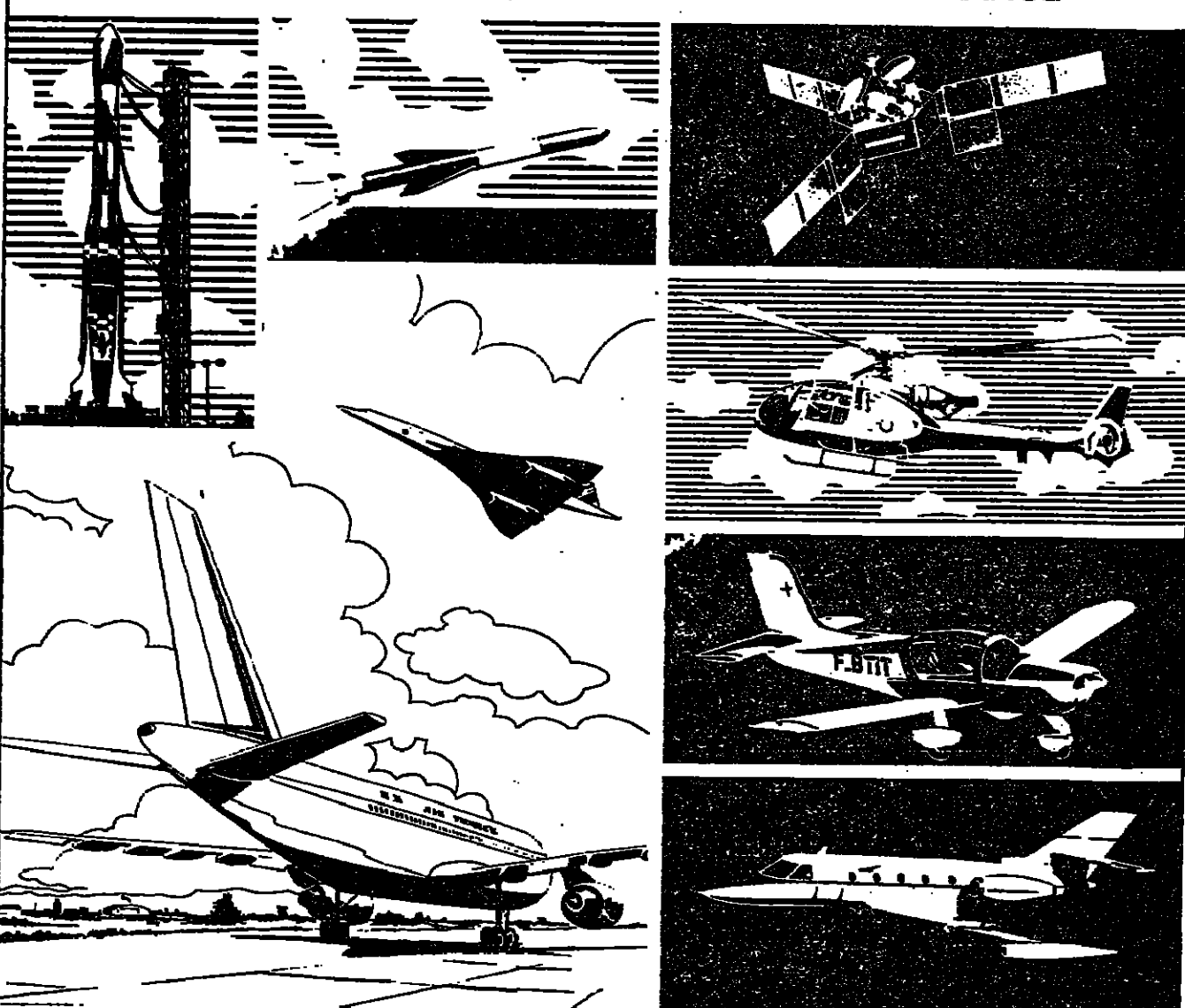
Presumably there must prospects for the export Tu-144s, since there is on competitor, Concorde, ever as Concorde's maker found, it is not exactly a market, and there are countries in the Soviet which could afford to make good use of an SS. But the expansion of the "largest airline in the world" (though the size of fleet is a State secret), it is direct to 90 international nations, the latest being Mexico, as from July. R sharing rights across Siberia the Far East have also proved useful to Western airlines both cargo and passengers. year. Aeroflot carried passengers, and expects to carrying 127m. by 1980.

David Lasce

East Europe Correspondent

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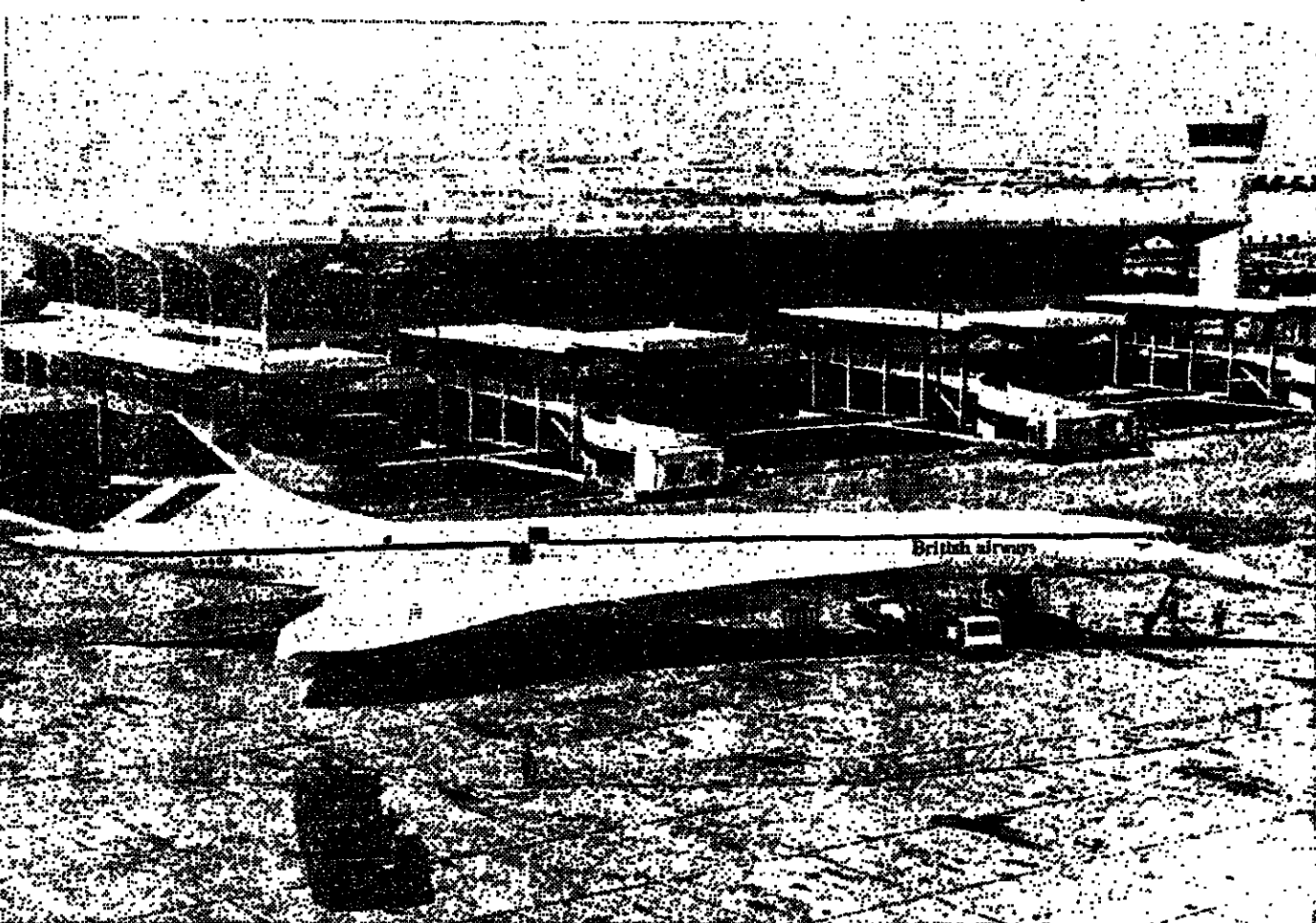
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AEROSPACE XIII

Airports fail to ease congestion problems



Concorde at Dubai Airport.

WITH the resumption of air from the environmentalists' have considerable expertise in major new developments at passenger and cargo traffic viewpoint, regardless of the airport construction and operation. A new group has also been formed, called British Airport Equipment (comprising Reliance-Mercury of Halifax, Albatross of London, and the Maplin project in Engineering of Kelghley, ACS Engineering Sales of Stamford, also been spending heavily on improving many of these, especially for example Sumburgh in the Shetlands, to meet the growing needs of the North Sea oil and gas industries.

One of these problem areas is that of airports. It was a problem before the recession in many countries, because the rate of passenger traffic growth, averaging 12 to 15 per cent a year, was forcing more and more passengers and aircraft into an airports system that was not expanding at the same rate. Coupled with increasing pressures from environmental lobbies for the restriction of both new airport developments and the expansion of many existing facilities, the result was both a saturation of runways and a capacity at many airports at certain times of day, and frequent congestion in terminal buildings.

Shelved

Now that the expansion in air transport is being resumed—with an expected annual average growth of 8 per cent a year in scheduled operations world-wide between now and 1981—many of the world's airport problems are bound to recur. In many countries, plans for new airports or the expansion of facilities at existing ones, conveniently shelved when looked as though the recession was going to be long and deep, must now be dusted off and re-examined. In some countries, especially the highly developed industrialised countries of Western Europe and the U.S., the development of new "green-field" airports has come to be regarded as a retrograde step

Total spending

While no official figures are available for the current volume of airport development world-wide, it has been estimated that total spending on new airports is not likely to be less than £1bn. between now and 1990, and may well be considerably more, while if the sums that will be spent in improving the existing airports system are also taken into account, this figure could probably be multiplied several times.

The British Airports Authority itself has always maintained that the air transport recession would be temporary and that sooner or later growth would be resumed. As a result, it has been spending substantial sums on improving facilities at all its airports, with further substantial outlays—amounting to about £150m.—planned up to 1980. This funding is designed to ensure that, notwithstanding the slower rate of growth in traffic, the major U.K. airports will remain capable of meeting all the demands placed upon them up to the mid-1980s.

The BAA developments, for example, are aimed at making Heathrow capable of handling 38m. passengers a year by 1985, Gatwick 18m., and Stansted 1m. Also in the London area, Luton Corporation is developing Luton airport to handle 3m. passengers a year. In addition, the BAA is financing

planning suggests that it will eventually be required to handle between 6m. and 8m. passengers a year, with a total of about 20 stands for wide-bodied aircraft if developed for long-haul traffic, or 25 stands (including 12 for wide-bodies) if developed for short-haul work. These developments are either already under way, or are envisaged, to meet the anticipated growth by 1985. It is beyond that date that some significant further problems seem likely to occur, especially if the current forecasts of continued air traffic expansion prove to be well-founded. For example, some forecasts have suggested that the traffic at the four South-East airports alone might reach 70m. a year by the mid-1980s, rising thereafter to reach as much as 100m. a year or so by 1990.

It is to try to verify these longer-term forecasts, and to discover ways of meeting the demand posed by traffic figures of the magnitude anticipated, that the U.K. Government has embarked upon a long consultation process on future airports decided in the next two to three years whether a fifth

consultation documents have been published, one relating to the problems of South-East England, and the second relating to the regional airports. These documents have been criticised by some people as being inconclusive about future airport strategy in the U.K. This criticism, however, misses the whole point of the debate—

which is to get as many views as possible on what is likely to happen, and what the reactions to those events are likely to be, from the widest possible range of interested parties, so that some reasonably acceptable long-term airports policy can be evolved in sufficient time to avoid having to implement unsatisfactory emergency ad hoc decisions in the 1980s.

Sludge works

Because of the long "lead times" involved in the development of any new airport, much of the planning for what may have to be undertaken after 1985 must be done in the years immediately ahead. For example, it will have to be decided in the next two to three years whether a fifth passenger terminal will be needed at Heathrow to raise that airport's total capacity to about 53m. passengers a year. This is because such a terminal would have to be on the Perry Oaks site to the west of the airport, involving the removal of the existing sludge works. This development would probably take about 12 years, so that even if a decision to do it were taken in, say, 1983 (when it might become reasonably clear what the rate of air traffic growth was likely to be through the rest of the 1980s), it could not be ready much before 1995. Similarly, to develop a second major terminal at Gatwick, to raise that airport's capacity to 25m. passengers a year, would take seven years, so that if it were started in 1983 it would not be ready until 1990.

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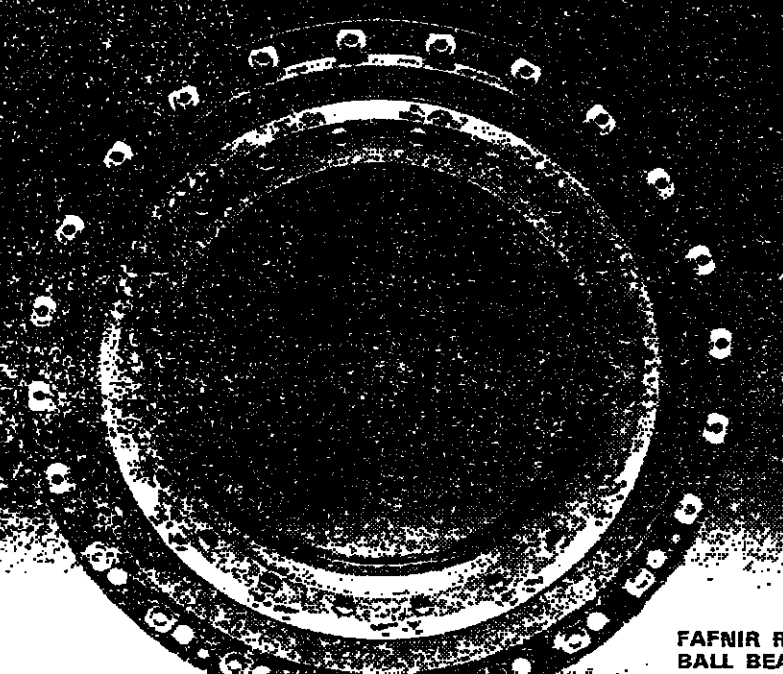
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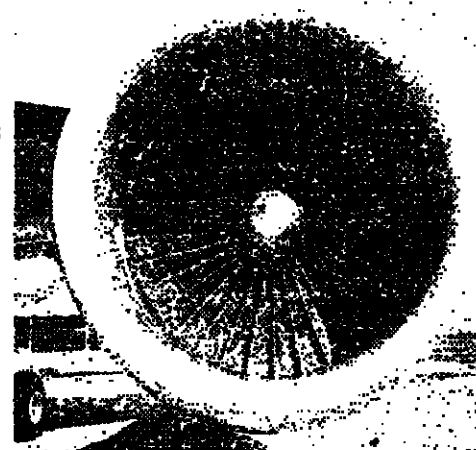
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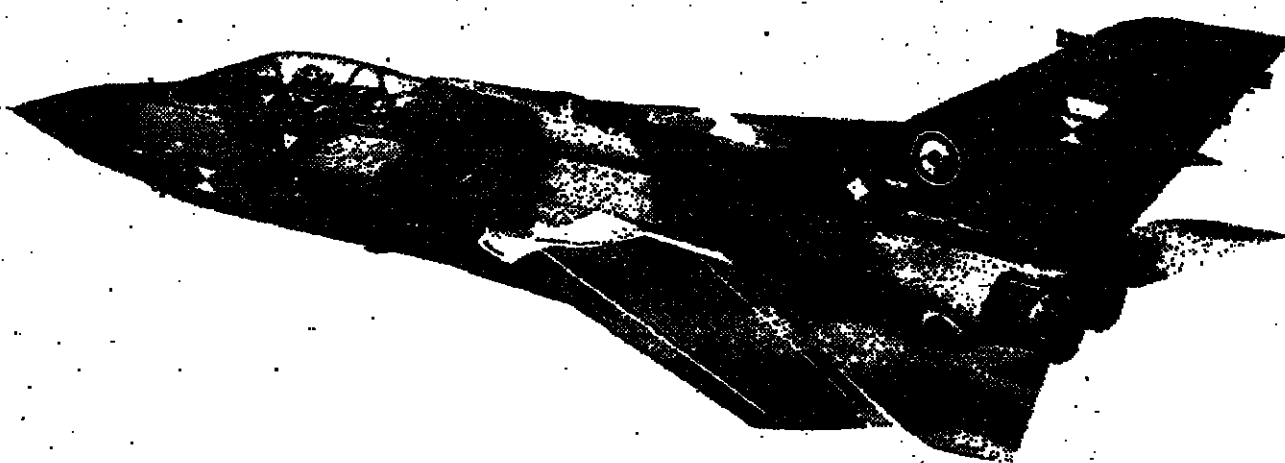


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AEROSPACE XIV

Italy's civil market stake



The variable geometry wings of the MRCA Tornado are the product of Italian design and construction.

THE EXPERIENCE of Italy's aerospace industry over the last five years has eloquently demonstrated how difficult it is to build up a modern industry without determined political and financial backing by the State. Certain sectors of the industry, such as light military and civil aircraft and helicopters, have done extremely well and have excellent export-based order books for new products. But the State-owned sector is badly in need of, first, firm new orders for military aircraft; secondly, a recovery in world civil aircraft orders sufficient to persuade its major partner Boeing to go-ahead finally with the 7X7 project; and thirdly, a thorough-going re-organisation to give a more rational shape to its present unco-ordinated form.

For decades Italy has spent a smaller percentage of its GNP on defence than any of its Nato partners and this has led to, among other things, an extremely low level of spending on new equipment. The bulk of the already inadequate defence allocation has inevitably been eaten up by wages, salaries and current expenditure of all kinds.

To remedy this the Ministry of Defence has prepared plans for the modernisation of all three services. The Navy modernisation plan has already been approved by Parliament and is in operation. The Air Force modernisation plan, however, has been a victim of political instability. This instability resulted in two Government crises and early general elections last June, followed by lengthy negotiations to form a new government. All this meant that legislative activity has been practically impossible over the whole of 1976 so far, and the Air Force Modernisation Bill is one of many urgently awaiting approval by the new Parliament which opens in September.

The Bill, which provides for the expenditure of L1,265bn. (£850m.) on aircraft procurement over the next ten years is the key to two major projects. The first is the Tornado MRCA combat aircraft, of which the Italian Air Force is pledged to buy 100 units; the second is a new jet trainer in anticipation of which Aeritalia has prepared a new model, the MB-339 to replace the highly successful MB-326, which has sold over 650 units in ten countries.

The Bill has the backing of all the political parties, including the Communists, and is expected to be finally approved by Parliament in October. This will allow the Italian Government to place a firm order for the 100 MRCA Tornados which will in turn ensure major contracts for Aeritalia and other sub-contractors which were given the task of making the variable geometry wings which are the key to the Tornado's success.

In many ways it can be taken as a tribute to Italian aeronautical engineering skills that this most difficult part of the aircraft was contracted out to Italian engineers, who have demonstrated over many years

their ability to resolve complex problems with the sort of imagination and dexterity which has long characterised the best of Italian engineering.

Aeritalia desperately needs the MRCA contract to supplement existing work on the G-222 military transport, the G-91Y fighter and the Lockheed Starfighter F-104 S, all of which are coming rapidly to an end. Last year Aeritalia, formed five years ago by the merger of Fiat's airframe interests with those of the IRI-Finmeccanica group, lost a further L19,9bn., so bringing its total accumulated losses up to L67.5bn.

Essential

The losses, caused principally by high interest charges, under-utilisation of capacity, the writing-off of research work done in connection with the abandoned STOL project with Boeing, and the short production runs of the G-222 model, make it essential for shareholders to write down the capital and inject fresh funds.

But Fiat, having originally looked upon Aeritalia as an ideal way of hiving off its loss-making airframe activities, is very reluctant to inject fresh cash and intends to reduce its holding from the original 50 per cent, by not subscribing to the projected capital increase.

Orders in connection with the MRCA Tornado will breathe

fresh life into the military activities of Aeritalia but it relies heavily on realisation of the Boeing 7X7 project for future work on the civil side. Up to now it has survived principally on sub-contracts for assembling fuselage panels and tail units for the McDonnell-Douglas DC9 and DC-10 at Pomigliano d'Arco near Naples, and panels for the Dassault Mercure aircraft at Turin.

Parliament has set aside 150bn. Lire to finance Aeritalia's participation in the 7X7, but the money will not actually become available until the project is defined and put into operation. It is earmarked mainly for construction of new assembly facilities at Foggia, but, contrary to earlier reports, this remains only at the project stage.

Meanwhile Boeing is continuing its search for other partners in the 7X7 and the Japanese Civil Jet Transport Development Corporation has reportedly expressed its desire to join the consortium. But this depends on final approval from the Japanese Government's Aerospace Council. Boeing is also believed to be looking for another European partner and aerospace industry sources here indicate the West German MBB as the most likely prospective new partner.

In the long run Aeritalia clearly hopes that participation in the 7X7 project will finally

place some of its ageing and costly Caravelles and DC-8s Alitalia has offered either the European Airbus A-300 or stretched versions of existing older, generation aircraft—including the Boeing 727, seven of which were offered on a leasing basis. Alitalia chose the latter—although this choice has been heavily criticised in Italian aerospace circles, according to Italy's most authoritative aerospace news report 'Air Press'.

Italy's most authoritative aerospace news report 'Air Press' has now decided to buy to follow up its highly successful

the aircraft. In this way Alitalia has added another old generation airliner to its already mixed Douglas, Boeing and Caravelle fleet in a move which critics claim is likely to improve Boeing's chances of eventually selling the 7X7 as a replacement aircraft to Alitalia for the 1980s, but will also add to Alitalia's already severe operating problems in the meantime.

As far as Aeritalia is concerned, however, the day when the MRCA and 7X7 projects move into the production phase will be a great relief.

Whether Aeritalia will ever make any profits from its activities remains to be seen but it should be remembered that the decision to set up the group was essentially a strategic one aimed at giving Italy a substantial presence in the high technology world of aerospace, a presence which it was always recognised would cost a high price to establish.

But while Aeritalia has its problems two of the principal private aerospace companies, Rinaldo Piaggio of Genoa and Aeromobili di Varese, near Milan, are doing very well—as is the Agusta helicopter group, now run by the State-controlled Efim-Breda finance company.

Piaggio has just put new life into its P-166 multi-use light transport by replacing the old piston engines with turbo-prop.

Agusta is well placed to follow up its highly successful

MB-326 trainer/light bomber with the new MB-339 which has just made its first flight and will be shown in nationally for the first time Farnborough.

Aeromobili initially has on the L100bn. set aside new trainers in the Italian Force renewal programme hopes to use this as a solid to repeat the export success achieved with the MB-326, has also obtained the Teledyne licence to produce the Fire "drone" for sale to Nato for Last year Aeromobili exported aircraft and equipment worth L26.5bn., over 70 per cent of its L33.8bn. turnover.

The Agusta helicopter group also reported higher turnover of L158bn., of which the company Agusta accounted L97bn., up 31 per cent, reported a net profit of L1.12. Exports are booming, thanks substantial orders from Iran Chinook helicopters made up licence and also orders for own Agusta 109 model. latter marks a considerable achievement for the helicopter industry which having established itself, the basis of licensing arrangements from all the major producers, has now developed sufficient skills to design, produce its own helicopters well as adding its own refinements to models made up licence.

Indeed, in many respects Italy's determination to establish a viable aerospace industry represents an intelligent challenge for a country anxious to develop new technology sectors to ensure its survival as an advanced industrial country. But in order to make the best out of human and technical resources available the industry needs better access to capital and considerable rationalisation, the widely dispersed public sector at present divided between the Stet and Finmeccanica divisions of IRI and other State holding companies.

But there are increasing signs that this is now recognised, the public sector of the industry is likely to be regrouped eventually into some kind of "Aeritalia" or aeronautics holding company, within the overall context of that rethinking of the role of State enterprises currently taking place in Italy.

Anthony Robins
Rome Correspondent

West Germany disillusioned

THE NEWS that Dassault and a joint production deal with Aérospatiale of France plan to the Americans, and how the joint forces with McDonnell-Douglas of the U.S. to build a 180-seat version of the unsuccessful Mercure 100 has shattered three months of uneasy illusion in the West German aircraft industry. The main illusion was that the "Airbus," a technically successful aircraft built by a French-German consortium with British participation, was to be scaled down to provide a new smaller model in co-operation with Boeing of the U.S. and would thus become the first basically European airliner to win wide acceptance on both sides of the Atlantic.

The false hopes were broadcast to some extent by the mood of transatlantic co-operation that was prevalent at the Hannover Air Show at the beginning of May. All the talk there was of the way that the Group of Seven European aircraft constructors would be co-operating in arranging

directed some urgency into the topic of transatlantic co-operation.

This development in the fortunes of the Airbus project is more than just a setback to one of many projects in which the German aerospace industry is engaged: the Airbus is fundamental to the German Government's plans for the German industry. Last November Herr Martin Gruener, a Secretary of State in the Bonn Economics Ministry, produced a report on the German aerospace industry to provide a basis for the Government's aerospace policy.

This report cited the Airbus as the central element in the Government's continued readiness to provide government funds to back the production of civil aircraft. It regarded this as a "family" of aircraft from it, the kernel of future European co-operation in civil aircraft construction. It recommended that the German

Government start negotiations aimed at bringing the British and Italian Governments into continuing operations in the Airbus project as shareholders.

Orders
The German aerospace industry currently employs 45,000 people in three main companies. Its turnover last year was DM4.3bn.—or about £1bn.—or about 7 per cent, down on that of the previous year. This was not really due to the recession, but to a slow-down in the flow of orders from the public sector: 85 per cent of the industry's turnover is paid for out of public funds. Last year's exports by the industry were DM380m., an increase of 16 per cent.

The Gruener report sought to establish what value West Germany was getting for its taxpayers' money. A cynic would say that it was inevitable that the report ended up by suggesting that the status quo should be maintained, provided there were changes in the way the industry organised itself in the

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مكازم الذهب

Nicholas Colchester
Bonn Correspondent

AEROSPACE XVI

Favourable view in the Netherlands

DESPITE THE rather difficult situation in the world aviation market, there have been a number of favourable developments for the Dutch aerospace industry and its main proponent Fokker. This Dutch arm of the German-Dutch VFW-Fokker company has shared in most of them. But the company still faces uncertain sales prospects for its aircraft.

The domestic aircraft industry, centred around Schiphol, has, however, shown significant activity, particularly last year when numerous Dutch factories were in difficulties as a result of the recession and massive short-time working had to be introduced.

Fokker has escaped most of this. But though it is still able to report "good" order books for its ever-popular F-27 Friendship turbo-prop commercial aircraft, the position regarding the F-28 Fellowship is by no means bright. Capacity expansion plans have been adapted and the Fokker company has "urgently requested" the Government in The Hague for some form of marketing support in the credit sector.

The company said it was facing "cut-throat" competition from U.S. manufacturers, who are much aided by a comparatively cheap dollar, certainly when compared to the guilder. Steep rises in costs in the Netherlands are another negative factor. It appears, however, that the Netherlands Government does have an ear for the company's problems, having finally decided not so long ago, and to the great relief of the industry as a whole, that advanced technology was something that was there to stay in the Netherlands.

It had allocated money to Fokker for studies on a successor to the F-28, which it is "earnestly hoped, will one day become a 'European' aircraft. And it was recently made known that the Economics Ministry has decided to set up a study group to look into the F-28 marketing problems.

Finally, the Science Ministry has decided to set aside money for a possible new space project, to succeed the successful "ANS" project, the launch of a satellite which only recently completed operations. Nothing is known about the Economics Ministry's decision on aid for the F-28 sales—the company employs some 8,000—but Fokker executives have good hopes. As regards the development study involving the new F-28 as aircraft for the 1980s, the grant obtained was Fls.25m.

Pleas

It is understood that Fokker has also asked the Government for a Fls.25m. subordinated loan to improve its capital base. The company has also made several pleas to the Government for financial support for the A 300B Airbus project—in which its participation as a sub-contractor has not been financially rewarding, but can be maintained as a subcontractor for the parts. The German arm of the group is a full participant, as the W. German Government was prepared to release the necessary funds.

This year the long-awaited signatures were put to the various contracts involving industrial compensation work and co-production of the military fighter replacing the ageing Starfighters, the General Dynamics F-16. This follows the co-production agreement signed last year between the U.S. Government and the four European countries—the Netherlands, Belgium, Norway and Denmark—which had opted for the General Dynamics aircraft. The countries involved have ordered nearly 350 of the aircraft.

Companies involved in the programmes include Fokker and the Philips Company Hollandse Signaal. In Belgium the VFW-Fokker affiliate S.S. Belge de Construccions Aeronautiques (SABCA) will also be benefiting from the F-16 work. VFW-Fokker said in its 1975 annual report that SABCA's work on

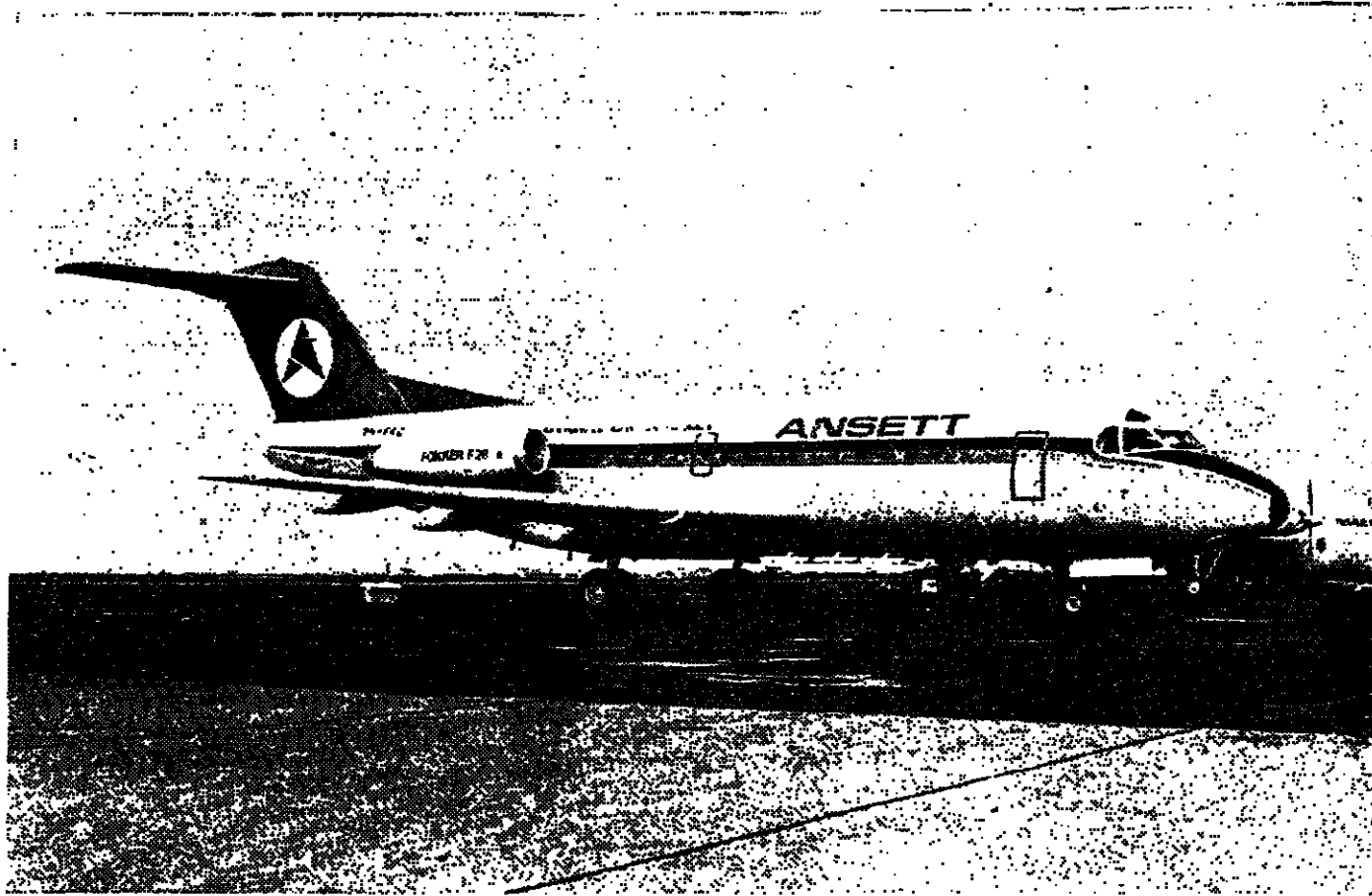
commercial aircraft was focused on the share in the production of the F-28 and the VFW 614.

Work on the latter aircraft is also carried out at Schiphol, and after a difficult start 16 planes have been sold and there are good hopes for the future.

A Fokker spokesman said great hope was pinned on a possible order from the U.S. Coast-guard services, which was in the market for around 40 aircraft. Although it is accepted that the U.S. market is almost impossible to penetrate following surging charges on imports, it is thought Fokker has said of the work transfers.

Fokker has said of the work transfers.

Fokker has said of the work transfers.



Fokker Fellowship in the colours of Ansett Airlines of Australia.

first aircraft should be ready in mid-1979, while delivery of the first sets of components is due for spring, 1978. Fokker will also be involved in further orders from third countries. Interestingly, a number of Dutch medium-size and smaller companies in the field of fine mechanical techniques and technology joined forces not long ago into a form of "aerospace" group.

The Netherlands Agency for Aerospace Programmes (NIVR) noted in its 1975 annual report that although the group had in the first instance been set up to participate in the General Dynamics co-production programme, it wants to eventually enhance its chances of being accepted as suppliers in aircraft and aerospace projects.

"This could possibly be the first step towards an association of Dutch aircraft and aerospace industries, for which we have been issuing pleas repeatedly," the NIVR stated.

Besides military orders, a number of Dutch companies have earned themselves a reputation in the space field. Following the completion of the "ANS" project, the Dutch industry was entitled to call itself "space qualified," and with the aid of the Government it is battling hard to maintain this status. The Cabinet decided early in 1975 to release "Mercurie" passenger airline funds from its budget for technological development projects for a preparatory study for the possible development of a second Dutch infra-red astronomical satellite (IRAS) within an international co-operation programme. The sum allocated was Fls.2.2m.

The "ANS" project had cost in all Fls.79m., almost double the original expectations, to which the Government contributed Fls.65.5m.

In its annual report, the NIVR, besides discussing the difficulties in marketing aircraft such as the Fokker F-28 and

Positive

Fokker is actively watching developments in the European and American aircraft business on efforts to reach certain operation agreements. VFW-Fokker said in its annual report, "not least with a view to a possible improvement of a transatlantic market for a 'space qualified' and view of the recently disclosed Aerospaceplane-McDonnell-Douglas-Dassault decision in principle this status. The Cabinet decided early in 1975 to release 'Mercurie' passenger airline funds from its budget for technological development projects for a preparatory study for the possible development of a second Dutch infra-red astronomical satellite (IRAS) within an international co-operation programme. The sum allocated was Fls.2.2m.

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Michael van O Amsterdam Correspondent

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مكازم الذهب

COMPANY NEWS

Marshalls (Halifax) sales expanding

THE CURRENT year is proceeding satisfactorily for Marshalls (Halifax) with sales ahead of last year, says the chairman, Mr. D. R. Marshall.

He stresses however that there must be some reservation regarding the concrete division because of the proposed reduction in local government expenditure.

But he is confident that the company will make the best of those opportunities which are available and have every prospect of making a satisfactory profit for the year.

Although the present economic background does not encourage new investment the directors shall continue to look for and take those opportunities for expansion. The company has excellent growth prospects, he declares.

Financially the group is in a strong position. It has a sufficiently high cash flow to enable plant and machinery to be replaced as required and also to carry out improvements in manufacturing methods. Capital expenditure during the past year was higher than for the previous year, and it is hoped to increase this still further this year.

Comments at March 31, 1976, were £20.5m. (£20.5m.) including £10.1m. (£10.1m.) authorised but not committed. It is proposed to increase the authorised capital to £17.5m. by the creation of 1m. Ordinary 25p shares.

As known group pre-tax profit for the year advanced from £1.2m. to £1.6m. on a turnover up from £12.4m. to £18.0m.

Close financial control affected a reduction of £0.4m. in borrowings, while more than £0.8m. was invested in new plant. Also working capital increased by more than £0.8m. in order to advance the business and offset inflation.

The return on capital employed improved from 14 to 18 per cent., and earnings per share rose from 10.7p to 13p.

Meeting, Halifax, September 27 at 2.30 p.m.

Progress at Midland Educational

Booksellers, stationers and educational supply contractors Midland Educational reports a pre-tax profit for the year to March 31, 1976, of £215,020 against £206,777 for last year.

The final dividend is 2.40712p net per 50p share, up from 2.113p, making a total of 3.842p (3.888p).

Turnover for the year is £3,241m. (£3,231m.), and tax is £171,340 (£154,965).

Earnings per share are given at 10.57p (10.21p).

HIGHLIGHTS

Insurance specialists are going to be rushed off their feet on Wednesday but thereafter the week's results list resumes its seasonal drabness. To-morrow sales in interim figures from Turner and Newall and Ocean Transport while on Wednesday there are half-timers from Guardian Royal Exchange, Sun Alliance and Phoenix Assurance. BSR also puts out an interim on Wednesday. Richard Costain arrives to-day and on Thursday there are six month figures from European Ferries.

Houchin set to advance

IN HIS annual statement, Mr. R. W. Houchin, chairman of Houchin Holdings, declares that "a pattern for the future is emerging and I can see that we have a period of relative growth ahead of us. I can assure you that our plans are well laid and we are taking every opportunity to ensure the future success of the company."

Indicating the underlying strength of the company, he reveals that despite an increase in stock and work in progress from £1,039,252 to £1,235,821 the group held cash at bank of £385,588 compared with an overdraft of £132,859 in the previous year.

Houchin entered the current year without bank borrowings and this trend continues.

On current trading, Mr. Houchin declares that the current order book is healthy and sales effort is maintaining it at an acceptable level.

The company has revalued its freehold land and buildings and this has resulted in a revised asset value in excess of £1 per share.

As reported, group pre-tax profits expanded from £257,363 to £266,403 in the year ended April 30, 1976. On a CCA basis the adjusted profit would be £260,000.

Meeting of the group (makers of ground equipment for aircraft electrical servicing and cargo handling) is at Ashford (Kent), October 7 at 11 a.m.

Jamaica loses bauxite sales

Jamaican bauxite production fell by 20 per cent. in the first half of this year. Our Kingston correspondent reports that output was 4.3m. tonnes compared with 5.3m. tonnes in the January-June period of 1975. Exports were 10 per cent. down and alumina sales declined 47 per cent.

dollars. The volume of U.K. sales levelled out, but the company satisfactorily maintained its position in the U.K.

There was less of a levelling process in hire activity and it is intended to continue the policy of investment in this area, says Mr. Russon.

Industrial and Commercial Finance Corporation and an associate owns 14.6 per cent of the Ordinary.

Meeting, Solihull, October 4 at noon.

Hillards sees profit increase

MR. G. N. HUNTER, chairman of Hillards reports that the first 16 weeks' trading of the current year show sales increases of 25 per cent., and it is anticipated that net trading margins will improve slightly during the year, giving a further increase in net profits.

The company has the organisational and financial resources available for further expansion and is constantly engaged in the search for sites for more super-markets, he adds.

As reported, group pre-tax profits in the 33 weeks ended May 1 1976 expanded by 66 per cent. to £1,077m. On a CCA basis the figure would be £1,249m.

As anticipated, the turnover exceeded £50m. and increased by 35 per cent. to almost £55m. To some extent the increase represents higher turnover at the stores which were being opened in May, 1976. To a considerably greater extent, says Mr. Hunter, the increase arises from the continuing development of eleven supermarkets added to the group during the following fourteen months.

Since July, 1975, a freezer centre and a small non-food store have been opened and plans are being completed for two new supermarkets to be built for the group.

In December, 1975, the financial position of the group was further improved by a loan of £840,000 to enable the company to acquire for that amount the reversionary interests in the freeholds or long leases of four supermarkets.

At May 1, 1976, net cash balances totalled £1.6m. Subsequently arrangements have been completed for the company to acquire for that amount the reversionary interests in the freeholds or long leases of four supermarkets.

Meeting Leeds, September 21 at 12.30 p.m.



Mr. D. M. Pearson, chairman of BBA Group which is to-day due to announce interim results in respect of 1976.

Crowther & Nicholson position

MR. J. G. CROWTHER, chairman of Crowther & Nicholson said at the AGM that since his statement of August 11 the amount of cash invested had increased and was now £330,000, the increase being due to further trading receipts and disposal of plant. There still remained to be disposed of certain buildings, property and sundry assets, he added.

It was not possible to state what the final figure of realisation would be, as the sale of properties was subject to market fluctuations and there would be further costs associated with closure.

Until now the whole of the company had been actively engaged in the realisation of the company's assets and additional administrative work involved in the closure of the premises. Now that most of this work had been completed, the accounts had been audited and it was proposed that the executive functions of two of the directors should be terminated during the coming weeks leaving such executive responsibility as was required to the remaining directors, said the chairman.

All the directors had service contracts which would need to be determined as and when their services with the company were no longer required. Legal advice was being sought on the question of these contracts from the company's solicitors backed by an opinion of Queens Counsel.

As far as the future of the company was concerned, Mr. Crowther said he felt that unless meaningful discussions were in progress or in prospect by the end of October which were likely to result in an advantageous offer being made, it was intended to convene an extraordinary meeting to place the company into members' voluntary liquidation. This would expedite the distribution of cash available to the holders.

Corporate status for 'Bats' exports

On October, the international exports division of British-American Tobacco Company will become a separate company called BAT (U.K. and Export) and will be a wholly owned subsidiary.

The directors say this change provides a more appropriate structure for the BAT group's U.K. tobacco exports as well as the U.K. tobacco operation.

Tebbutt back in profit

A TURNROUND from a loss of £34,142 to a profit of £13,644 was announced by leather manufacturers, Tebbutt Group, for the first half of 1976, subject to tax of £7,000 (nil). Turnover was up from £1,038m. to £1,139m.

Again there is no dividend. The last payment, 0.67p net, was for the year 1975. For the year 1975 the company incurred a loss of £44,990.

Atlantic Assets

For the year ended June 30, 1976, revenue before tax of Atlantic Assets Trust increased from £245,000 to £285,000 before tax of £195,000 against £160,000.

The revenue is struck after interest and expenses of £892,000 (£730,000). Revenue available for Ordinary holders amounted to £120,000 compared with £115,000. The dividend is again 0.4p net per 25p share. Net asset value per share is 81p (55p).

Continued growth for F. H. Tomkins

DESPITE VARIOUS problems, Mr. C. G. Garman, chairman of F. H. Tomkins, says he is optimistic. Even though the British economy may lag behind the rest of the world, he still believes that the next accounts will show continued growth.

There are signs of a gradual recovery in demand for all the company's products, but he stresses that there are many uncertainties over which the directors have no control.

As reported on July 23 group pre-tax for the year to May 2 1976, was £281,880 against a rights increase of not less than £200,000, and compared with £1,115,879 for the previous year, on a turnover of £2,522m. (£2,811m.). Export sales from the U.K. amounted to £261,788.

The chairman says that the profit was considered satisfactory. This figure includes the post-acquisition profits of Hexagon Fastenings and the first four months' trading of F.H.T. Steelless which are not material in the total context. The fact that group turnover was up on last year was entirely due to inflation and reflects a severe reduction in volume.

The rights issue was very successful, some 91 per cent. of the offered shares being taken up. Part of the proceeds were utilised in the acquisition of Hexagon Fastenings and the formation and stocking of F.H.T. Steelless.

Following this issue only just over £200,000 of the authorised capital remains unissued. In order to provide a more satisfactory margin it is proposed to increase the authorised capital to £22m. by the creation of 10m. new Ordinary shares of each.

In spite of the recession a decision was taken that the manufacturing units should maintain production wherever possible, accepting that this would entail increased finished stocks. By doing this the group was able to avoid short-time working.

The five-year programme of manufacturing investment has almost been completed and the group is currently reviewing the future in the light of the present political and economic circumstances. "We shall also create

opportunities to further our contribution to the U.K. economy by the distribution of shares to the public."

During a year of reduced demand from both home and overseas, F. H. Tomkins Buckle-pan operated profitably, a result of exercising a very tight control of expenses. A decision was taken to increase prices, which helped to reduce margins at home.

BOARD MEETINGS

The following companies have dates of Board meetings in the next few days. Such meetings are held for the purpose of considering the accounts and the dividend, and for the purpose of considering the accounts and the dividend, and for the purpose of considering the accounts and the dividend.

TO-DAY: BBA, Crowther & Nicholson, F. H. Tomkins, Hillards, Kwikform, Marshalls, Tebbutt Group, Turner and Newall, Ocean Transport, Guardian Royal Exchange, Sun Alliance, Phoenix Assurance, BSR, Richard Costain, European Ferries.

TO-MORROW: Houchin Holdings, Midland Educational, Eastern Asia Navigation Company Limited, Waitrose, Atlantic Assets, Tebbutt Group, Hillards, Kwikform, Marshalls, Tebbutt Group, Hillards, Kwikform, Marshalls, Tebbutt Group.

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Eastern Asia Navigation Company Limited

Extracts from the Statement by Mr Y. K. Pao, C.B.E., Chairman, contained in the Annual Report for the year ended 31st March 1976.

RESULTS IN BRIEF	1976		1975		%
	HK \$'000	£'000	HK \$'000	£'000	
Total assets	2,578,240	272,830	2,255,985	211,632	14.28
Total profits	148,769	15,743	134,001	12,570	11.03
Net operating profit	154,541	16,354	111,803	10,488	38.23
Dividends per share	43 cents	4.5p	36 cents	3.4p	19.44

■ Despite the continued existence of unsettled conditions in the shipping markets and in the general economic climate, the consolidated net operating profit for the group increased by 38 per cent.

■ The world's principal economies have now proven to be quite resilient to the unexpected increase in energy costs and in less than three years, have regained most of their former performance. Requirements for oil as still the major source of energy have correspondingly increased.

■ The tanker market is still affected by the surplus previously mentioned, but in the spot market both the level of activity and the freight rates have shown improvements recently, indicating that the industry's "medicine" of lay-up, scrapping of older tonnage, and cancellation of new building orders is having the desired effect. While not trying to paint an overly optimistic picture, one must nonetheless focus on the improvements in rate levels from the bottom reached in December 1974. Of course, any significant increase in oil prices could again cause disruptions to the world economies by rekindling

the threat of inflation and consequently adversely affect oil demand and transportation requirements. All in all, however, your Board takes a cautiously optimistic view also of the near term for tankers.

■ The drycargo freight market has made improvements since September last year and has reacted to the economic turnaround sooner than has the tanker market, with considerable increase in volume. This sector of shipping market is, however, also susceptible to the same adverse factors that may affect the tanker market, and in addition the large number of bulk carrier new-building contracts that resulted from the conversions of earlier V.L.C.C. and U.L.C.C. orders may have a dampening effect on the market again in 1977-1978.

■ In the absence of totally unforeseen adverse conditions developing, your Board is confident that the group's next financial year will prove to be at least as favourable as that of the year under review. The group's vessels are all on period employment with only two V.L.C.C. charter parties expiring before 1981.

A MEMBER OF THE WORLD-WIDE SHIPPING GROUP OF COMPANIES

Big week for Waitrose

WAITROSE, the John Lewis Partnership's food group, resulted in a turnover last week of almost £2m., an increase of 41.7 per cent. on the corresponding week last year. It was an outstanding week.

Sales in the department stores and specialist shops, at more than £2.5m. were up 32 per cent. on 1975.

Total sales, almost £7m. were up 39.5 per cent. on 1975, and for the four weeks to August 28 were ahead by 27.9 per cent.

RESULTS AND ACCOUNTS IN BRIEF

ALBERT FISHER GROUP (wholesale fruit and vegetable merchants)—Results for the year to May 31, 1976, already reported. Group fixed assets £24,721,000. Net current assets £24,721,000. Meeting, Retiring, on September 22 at 12.30 p.m.

MAHARAJA GROUP (suppliers to building industry)—Results for year ended March 31, 1976, already reported. Group fixed assets £24,721,000. Net current assets £24,721,000. Meeting, Retiring, on September 22 at 12.30 p.m.

ALLIANCE TRUST COMPANY—Results for year ended March 31, 1976, already reported. Group fixed assets £24,721,000. Net current assets £24,721,000. Meeting, Retiring, on September 22 at 12.30 p.m.

ARMY PARK (CARDIFF) GRY.—Results for year ended March 31, 1976, already reported. Group fixed assets £24,721,000. Net current assets £24,721,000. Meeting, Retiring, on September 22 at 12.30 p.m.

HOUND RACING—Turnover, first half 1976 was £25,341 (£25,371). Profit £12,960 (£12,960). Meeting, Retiring, on September 22 at 12.30 p.m.

CLAVENHOUSE INVESTMENT TRUST—Results for year ended March 31, 1976, already reported. Group fixed assets £24,721,000. Net current assets £24,721,000. Meeting, Retiring, on September 22 at 12.30 p.m.

ELYS (WIMBORNE)—Interim 6.67p (6.67p). Turnover for year ended March 31, 1976, £1,700,570 (£1,700,570). Net current assets £24,721,000. Meeting, Retiring, on September 22 at 12.30 p.m.

HALLAM SLEIGH AND CHESTON—No interest (same). ETA SHRD CMF No interest (same). Turnover for year ended March 31, 1976, £1,700,570 (£1,700,570). Net current assets £24,721,000. Meeting, Retiring, on September 22 at 12.30 p.m.

MARCOET IRISH HOLDINGS—Turnover for year ended March 31, 1976, £1,700,570 (£1,700,570). Net current assets £24,721,000. Meeting, Retiring, on September 22 at 12.30 p.m.

HARROTT AND CO. (controlled by Kenneth Smith)—Pre-tax

OVERSEAS MARKETS

EUROBONDS

New issue volume hits prices

BY MARY CAMPBELL

WITH NO LET-UP in the pace of new issue announcements, the U.S. dollar secondary market showed increasing signs of strain last week. That it is the sheer weight of new issues which is keeping the market down there can be no doubt—interest rate factors are seen as if anything pointing the other way.

Of the issues which were priced last week, the 10-year bonds of the Michelin were being quoted on Friday about a point down on their offering prices of 98 1/2 for the 9 1/2 per cent, 12-year bonds, and 99 1/2 for the 9 1/2 per cent, seven-year notes. The 15-year Norsk Hydro fell to a discount of around a half point from an offering price of 99 1/2 on the 9 per cent coupon, with a further fall to 98 1/2 being reported later on Friday. The Ontario Hydro and Sydkraft issues held up rather better, but were still being quoted below their issue prices of 99 1/2 and 99 respectively.

The major U.S. dollar issue announcement last week was \$100m for Denmark With Union Bank of Switzerland as lead manager, the issue offers an indicated coupon of 8 1/2 per cent on an eight-year maturity. The

Indices

NEW YORK - DOW JONES

	Sept. 2	Sept. 3	Sept. 4	Sept. 5	Sept. 6	Sept. 7	Sept. 8	Sept. 9	Sept. 10	Sept. 11	Sept. 12	Sept. 13	Sept. 14	Sept. 15	Sept. 16	Sept. 17	Sept. 18	Sept. 19	Sept. 20	Sept. 21	Sept. 22	Sept. 23	Sept. 24	Sept. 25	Sept. 26	Sept. 27	1976				1976 compilation																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
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Industrial...	989.11	984.79	985.95	973.74	988.92	983.92	1011.21	986.71	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1011.70	1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AUTHORISED UNIT TRUSTS

Unit Trust Mgrs. Ltd. (a)(b) Capital: 100.00 Income: 100.00 Dividend: 100.00 ...	Bridge Tallman Fd. Mgrs. (a)(b) Capital: 100.00 Income: 100.00 Dividend: 100.00 ...	G.T. Unit Managers Ltd. Capital: 100.00 Income: 100.00 Dividend: 100.00 ...	Kleinwort Benson Unit Managers Capital: 100.00 Income: 100.00 Dividend: 100.00 ...	Mercury Fund Managers Ltd. Capital: 100.00 Income: 100.00 Dividend: 100.00 ...	Piccadilly Unit Tr. Mgrs. Ltd. (a)(b) Capital: 100.00 Income: 100.00 Dividend: 100.00 ...	J. Henry Schroder Wagg & Co. Ltd. Capital: 100.00 Income: 100.00 Dividend: 100.00 ...	Target Tr. Mgrs. (Scotland) (a)(b) Capital: 100.00 Income: 100.00 Dividend: 100.00 ...
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INSURANCE, PROPERTY, BONDS

REGIONAL MARKETS A selection of the share prices previously shown under regional headings is set out below...	BASE LENDING RATES Allied Irish Banks Ltd. 10 1/2% Anglo-Portuguese Bank 10 1/2% ...	Abbey Life Assurance Co. Ltd. Capital: 100.00 Income: 100.00 Dividend: 100.00 ...	The City of Westminster Assur. Soc. Capital: 100.00 Income: 100.00 Dividend: 100.00 ...	Hambro Life Assurance Limited Capital: 100.00 Income: 100.00 Dividend: 100.00 ...	Lloyds Bk. Unit Tr. Mgrs. Ltd. Capital: 100.00 Income: 100.00 Dividend: 100.00 ...	Prop. Equity & Life Ass. Co. Ltd. Capital: 100.00 Income: 100.00 Dividend: 100.00 ...	Slater Walker Insurance Co. Ltd. Capital: 100.00 Income: 100.00 Dividend: 100.00 ...
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OFFSHORE AND OVERSEAS FUNDS

FINANCIAL TIMES STOCK INDICES 1976 Sept. 2 Sept. 8 ...	HIGH AND LOWS 1976 Sept. 2 Sept. 8 ...	S.E. ACTIVITY 1976 Sept. 2 Sept. 8 ...	FT-ACTUARIES INDICES 1976 Sept. 2 Sept. 8 ...	Archibald Securities (C.I.) Limited Capital: 100.00 Income: 100.00 Dividend: 100.00 ...	Cornhill Ins. (Guernsey) Ltd. Capital: 100.00 Income: 100.00 Dividend: 100.00 ...	Hambro (Guernsey) Limited Capital: 100.00 Income: 100.00 Dividend: 100.00 ...	Kleinwort Benson Limited Capital: 100.00 Income: 100.00 Dividend: 100.00 ...	Old Court Commodity Fd. Mgrs. Ltd. Capital: 100.00 Income: 100.00 Dividend: 100.00 ...	TSE Unit Trust Managers (C.I.) Ltd. Capital: 100.00 Income: 100.00 Dividend: 100.00 ...
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HOME NEWS

Flags of convenience ships
threat to safety—report

BY JOHN WYLES, SHIPPING CORRESPONDENT

FRESH evidence that ships registered in Liberia, Panama, Honduras and other newly emerging flags of convenience countries are a continuing threat to safety and anti-pollution standards is contained in a study to be published shortly.

The 137-page research report, sponsored by the Social Science Research Council, will fuel the long-running post-war debate over flags of convenience ships. Leading the opposition, the International Transport Workers' Federation repeatedly has organised ineffectual boycotts against ships because of their rates of pay and working conditions. Shipowners, particularly Americans and Greeks, have put increasing numbers of their vessels under these flags because of the undeniable commercial advantages they offer.

The authors of the study, The Impact of Flags of Convenience, Professor R. S. Doganis and Dr. B. N. Metaxas, argue that nearly 25 per cent. of world shipping has been attracted to flags of convenience because shipowners can avoid tax obligations and terms and conditions of employment which would apply if they registered their ships in their own countries. As a result, other maritime countries, including Britain, have been forced into a competition which has depressed potential Government revenues and failed to maintain employment opportunities for native seafarers.

Tax

At the end of the Second World War, Panama and Honduras were the only significant flags of convenience and together they amounted to only 2 to 3 per cent. of world tonnage. Since then, the Liberian flag has mushroomed from 50,000 gross tons in 1949 to 55,25m grt in mid-1974 and has been growing at an annual rate of 10 per cent., compared with

suggest. For example, the percentage of casualties, of ships registered in Panama and Greece is two to three times higher than their share of tonnage.

Liberia's safety record has improved and is only a few percentage points above its proportion of world tonnage. But, according to the study, all the indications are that the newer registries have an even poorer safety record than Greece or Panama—in 1971 and 1972 Somalia and Greece accounted for just more than 1 per cent. of world tonnage but about 4.5 per cent. of world casualties.

Analysing the incidence of pollution, the study finds that "there are strong grounds for believing that vessels under flags of convenience cause a disproportionately high share of oil spillage and pollution." This is partly because of their demonstrably higher accident rates and partly because the Liberian flag apart, flags of convenience tankers are smaller and older than the world average and less likely to use modern oil discharge procedures.

Cost

The study argues that flags of convenience ought to be regulated internationally for safety, conditions of employment and pollution control. However, a global analysis of the costs and benefits of these flags offers no guide to individual national shipping policies.

"Each country must consider from its own point of view whether it is better or worse off as a result of flag of convenience shipping and establish its own policies accordingly," the study concludes.

The Impact of Flags of Convenience, by Professor R. S. Doganis and Dr. B. N. Metaxas, study sponsored by the Social Science Research Council, and carried out at Polytechnic of Central London and Ealing Technical College; £6.

Brussels plan to tax
vegetable oils 'will
harm food industry'

BY ELINOR GOODMAN, CONSUMER AFFAIRS CORRESPONDENT

REPRESENTATIVES of Britain's food industry will tell officials from the Ministry of Agriculture this week that any moves in Brussels to tax vegetable oils and fats will harm many sectors of the British food industry and set a "dangerous" precedent which could be used in the future to tackle problems in other agricultural areas.

The Food Manufacturers' Federation will also confirm its members' opposition to the idea, still circulating in Brussels, that food manufacturers should be prevented from using both dairy fats and non-dairy fats in the same product.

This "exclusive use" provision, they claim, would, if implemented, result in the disappearance of many big selling brands—such as instant desserts and some kinds of ice creams—from the British shops, and the loss of many jobs in the food industry.

The federation has already received an assurance from Mr. Fred Peart, Minister of Agriculture, that he is totally opposed to the Commission's proposal to levy extra taxes on vegetable and marine oils and fats.

But the federation is anxious to supply the British Government with facts with which to fight its case at this month's meeting of the Ministers. The feeling is that, while the farming lobby is well represented in Brussels, food manufacturers' interests often go unheard.

The proposal to tax vegetable oils is part of a wider programme designed by the Commission to deal with the problems caused by a surplus of milk production in the Community.

This "co-responsibility" package has five main elements: a reduction of the dairy herd by introduction of a Community system of premiums for the

non-marketing of milk and the conversion of dairy herds; suspension of national and Community aid to the milk sector for three years; introduction of a "co-responsibility levy" under which a temporary levy would be brought in and applied in a uniform manner to all quantities of milk supplied to the dairies and on direct sales of dairy products to the farm; enlargement of Community markets, and the proposed tax on oils and fats.

The federation argues that this package would mean food manufacturers who do not even use milk in their products will suffer as a result of the problems in the dairy industry. The problems of the dairy industry, it claims, should be tackled within the industry itself and not by raising the price of competitive products to protect demand.

The retail price of milk in Britain went up by 1p a pint yesterday, adding around 0.2 per cent. to the Retail Prices Index.

Crisis as man's
resources
give out

THE industrialised world is facing a "difficult and disagreeable" last quarter of a century because the disappearance of natural resources is threatening to outpace synthetic alternatives. Mr. John Davies, MP, said in his presidential speech to the Incorporated Association of Preparatory Schools at Cambridge.

Adapting to a change of this description demanded understanding, self-discipline and persuasion of a kind we had not tried to develop.

Hops are only here for the beer
—in quantity and quality

BY STUART ALEXANDER

ANY FEARS that the drought may have caused a shortage of hops were discounted over the week-end as picking started. The crop is a little early, and will not be a bumper one, but the quality is described as very good and growers are confident they can supply the brewers with all they require.

Cutting and carrying are now largely mechanical. The days when whole families took their annual holidays in the hop fields are long gone. Some student labour will be used in the main hop-growing areas of Kent, and a few gypsies will find jobs in Herefordshire and Worcester.

The big brewers have their own gardens but there are an additional 13,150 acres under cultivation, with few growers tending more than 100 acres and few less than 30. Each year increases in the import of suit-able hops, mainly from Czechoslovakia and West Germany.

by the brewers—for 1976 it is

about 6,000 tons, or 77 per cent. of capacity. There is no spot price, as all production is taken up on fixed-price contracts with an inflation clause written in. But there is now a forward market up to 1979, in much the same way as there is on the Continent.

The hops are used to give beer its bitter flavour and are added to the brew during boiling. They have been in use in this country since the 15th century. When they are thought to have been brought over from Holland. Previously brewers relied just on malted barley for the flavour.

More lager

Saxon monks, regarded as great brewers, built a reputation that lasted for centuries using this ingredient.

The cones of the female plant are used with one or two male plants planted alongside in England's gardens to facilitate fertilisation and, therefore, seedling. For Continental lager unseeded cones are used. Growth in sales of that type of beer has led to increases in the import of suit-able hops, mainly from Czechoslovakia and West Germany.

Small businesses to consider aid plan

MERSEYSIDE Productivity Association has arranged a meeting in Liverpool tomorrow to outline the Government scheme to help small companies study the possibility of providing joint services for their offices.

Under the scheme, the Industry Department can give financial aid to groups of four or more companies, employing fewer than 200, towards the cost of studying possible joint services such as accountancy, marketing, purchasing or sub-contracting.

Jobless warning

The inadequate Government measures to deal with youth unemployment could lead to this year's 200,000 school leavers becoming unemployed this autumn.

Mr. Michael Jack, breaking Labour Party policy behind a cloak of secrecy over a Conservative, claimed at Nottingham. Mr. Bob Cryer, Labour MP for Keighley, said yesterday, it was a further step to extend

ations for their future attitude to employment.

Airport licence

The cost of the annual airport licence for the East Midlands Airport near Derby is likely to go up to an estimated £30,000 compared with the present £30 a year, according to a report by Mr. Eric Dyer, airport director.

Fewer deaths

The number of deaths in the steel industry fell from 41 to 36 in the past year, in spite of the Scunthorpe disaster, in which 11 men died.

Nuclear allegation

Defence Secretary Roy Mason was breaking Labour Party policy behind a cloak of secrecy over a contract to develop tritium in U.S., Germany and Sweden, as ham at the week-end. School leavers were likely to have their MP for Keighley, said yesterday, it was a further step to extend

U.K. capacity to produce made weapons.

Boeing test

The first Boeing 747 aircraft powered by Rolls-Royce RB211 engines has made its initial flight. Rolls-Royce said in Derby at a week-end. The aircraft flew 1 hr. 51 min. over the U.S. West Coast.

Pit protest

Villagers in the Vale of Belvoir launched a campaign at the week-end against the Coal Board plans to sink a £100m. pit in the area.

Religious books

Publishers of religious books in the U.K. are losing at least £1m. a year in sales because British authors are selling their manuscripts abroad, particularly in U.S., Germany and Sweden, as Mr. Peter Lord, managing director of publishers Marshall, Morgan & Scott.

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Business volume up 11% to DM 4.7 billion
Customers deposits up 13% to DM 3.8 billion
Loans up 15% to DM 2.8 billion
Net profit before taxes up 23% to DM 40.6 million
Substantial increase in international payments
Rise in foreign trade financing
Higher volume of bank to bank loans for financing imports from West Germany as well as in direct loans to foreign importers
Greater short term Euro borrowing for import financing
Growth in medium and long-term export credits
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Courts

Year ended 31 March	1976	1975
Turnover (excluding V.A.T.)	£40,068,000	£28,377,000
Trading Profit	£7,014,000	£4,733,000
Profit before Taxation	£5,411,000	£3,485,000

* These record results achieved by the group's 103 United Kingdom and overseas stores.
* Overseas profits from trading in 5 countries amounted to 45% of the group total.
* Accumulated deferred profit of £7,892,000 will flow automatically into future profits.
* Net assets, including deferred profit and directors' property valuation, over £25 million.
* Maximum dividend increase paid. Substantially higher payment when regulations permit.
* Turnover and profits so far this year are ahead of those in the corresponding period.

COURTS (FURNISHERS) LIMITED

مكتبات الأصيل

INSURANCE

PROPERTY—Continued**TRUSTS—Continued**

ANSWERS - Continued

[illegible]**MINES—Continued**

FAR WEST RAND

Low	Stock	Price	±	Net	Chr
250	Wycom 25	315	+5	075c	+
400	Baffels 1R	480	-10	012c	+
70	Deekrand Rn.5	125	-10	055c	+
30	Deekrand Rn.5	135	-10	055c	+
122	East Drie 1R	420	-10	075c	1.7
422	Fluandrand Gld. 2c	132	-10	012c	+
148	Esburg 1R	630	-5	013.8c	1.0
210	Estland 1R	140	-5	010c	+
260	Flout Gold 1R	375	-10	047c	+
140	Lihman 1R	120	-10	080c	+
230	Southland 50c	265	-10	010c	2.2
120	Swedish 50c	265	-10	010c	2.2
50	Ver. Nordic 50c	850	-25	010c	1.9
618	Ventespost 50c	75	-5	030c	1.9
131	W. Drie 1R	214c	-5	035c	+
480	Western Coast 1R	580	-10	010c	1.6
480	Western Deep 1R	580	-10	010c	1.6
120	Zandpan 1R	125	+5	010c	+

252

60	Free State Dev. Soc	45	Q9c	86
77.5	P.S. Geduld 50c	950	+25	1.3
120	P.S. Saniplan R1	66	28c	0
170	Harmony 50c	236	+6	0.5
38	Lorraine R1	52	Q6c	0.1
675	Pres. Brand 50c	775	+25	1.3
3195	Pres. Steyn 50c	430	16125c	2.2
750	St. Helena R1	825	10250c	1.2
79	Unise	82	-2	0.1
190	Welkom 50c	180	-10	1.7
2450	W. Holdings 50c	1113	1055c	2.2

FINANCE

[illegible]

DIAMOND AND FLAT

DIAMOND AND PLATINUM					
\$174	Anglo-Am Inv 50c	\$214	-1	Q244c	1 1/2
68	Banqueque Pl. 10c	92	-1	Q8.0c	2
187	De Beers DI. 5c	210		Q28c	2 1/2
850	Do. 40 pc Pl. R5	950	+50	Q200c	1 1/2
69	Lydenburg 12 1/2c	87	-2	Q12.9c	1 1/2
108	Port. Plats 2 1/2c	122	-2	Q19.5c	1 1/2
90	Union Plat. 10c	116	-2	Q14.0c	1 1/2
88	Watersval 5c	118	-2	Q105c	1 1/2

CENTRAL AFRICA

53	Coronation 55c	58	+3	Q34c	2
68	Falcon Rn. 50c	70		Q35c	1
9	Rhod n Corp. 16c		+1	0.56	6
120	Ronan Cons. 54	140	-10	Q16.0	4
140	Tanganyika 50p	172		Q10.0	6
65	Do. Pref. 80p	70		59	18
25	Wankie Col. Rh. 1	32	+2	100.3	1
24	Zam. Cpr. SBD 24	24	-2	Q54c	3

AUSTRALIAN

18	Armed 25	26		
132	A. M. and b. 50c	300	+10	4107c	4
96	B. M. and b. 50c	143	-2	Q10c	4
145	BH South 50c	210	-2		
25	G.M. Kalgortie 5L	25			
58	Hampton Area 5p	104	+3	13	3
38	Metals Ex. 50c	65	+3		
13	Metformin 20c	14			
200	M.N. H. and b. 50c	254	+2	4010c	

65	Mount Lyell 25c	65
2	Nonmetal 10c	2

138	North R. Hill 51	215	+2	Q9c	+
136	Nth. Kalgarv	7	+1	—	—
65	Oaklands 5A1	104	-3	Q9c	+
14	Pacific Copper 25c	32	—	—	—
2725	Panorati 25c	1134	—	—	—
9	Parings MEX 50	14	—	—	—
430	Pete Wallseed 30c	570	+10	Q15c	+
140	Poseidon 20c	215	+5	—	—
9	Vulcan Min 20c	10	—	—	—
4	Westmead 10c	6	—	—	—
127	Westn Mining 50c	127	+4	Q9c 9c	0
127	Whim Creek 20c	65	—	—	—

TMS

28	Amal Nigeria	30
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160	Ayer Hitam	285	258	2
170	Berati Tin	252	175	2
315	Beranti SMCs	378	Q890.5	1
12	Ex Lands 10p	12	1.0	1
155	Georor	220	5.0	1
7	Gold & Base 12p...	7	—	1
170	Gopeng Cons.	205	211.0	1
64	Hongkong	73	—	1
56	Idris 10p	63	7.15	1
4	Janaka 10p	6	—	1

31	Kamunting 15p	34
36	Killinghall	225

168	Malay Dredging	190	10.7	2
20	APahang	27 ⁴	30.6	2
40	Perpahlan 10p	48	47.0	1
104	Petaling SdI	125	012 ⁴	2
19	Saint Piran	34 ^m	1.25	2
64	South Kinta (110p)	73	49.5	1
105	Sthn. Malayan	147	10.7	0
31	Sungei Beal 20p	147		
29	Sungei War SdI	38	2010	

40	Tanjung 15p	43
40	Tongkah Hehe SMT	43

58	Trench	85	+4.29	2
COPPER				
35	Botswana RST #2	45	+2	—
170	Messina 80.50	200	-5	+Q35c
MISCELLANEOUS				

8	Burns Mines 17 $\frac{1}{2}$ p.	8 $\frac{1}{2}$...
20	Charterhall 5p	20 $\frac{1}{2}$ p	...

580	Cons. Murch. Inc.	675	-5	1.00	1
245	Northgate CSI	320	—	—	—
166	R.T.Z.	168	-2	5.42	2
80	Sabina Inds. CSI	85	+3	—	—
110	Tara Expt. St.	114	—	—
322	Tequity Minerals Inc.	43	—	11.08	—
84	Yukon Cons. CSI	131	-1	—	—

NOTES

Unless otherwise indicated, prices and net dividends are in dollars and denominations are 25¢. Estimated price/earnings ratios and covers are based on latest annual reports and accounts, where possible, are updated on half-yearly figures; the ratio to ACT of 35 per cent. P/E's are calculated on the basis of the distribution; bracketed figures indicate 10 per cent. preference if calculated on "all" distribution. Covers are "maximum" distribution. Yields, assuming maintenance of dividends on current rate of ACT, are based on middle price.

ness and allow for value of declared distrib-
utives with denominations other than one
eighth of the hundred dollar premium

...the investment occur premium,
...denominated securities which include invest
...ollar premium.
...Stock
...rights and Losses marked thus have been adjusted to
...rights issued for cash.
...ation since increased or refunded.
...ation since reduced, passed or deferred.
...free to non-residents.
...atures as report wanted

unlisted security.

1. ☐ Undistributed dividend after pending scrip and/or rights
 2. ☐ Other relates to previous dividend or forecast.
 3. ☐ Free of Stamp Duty.
 4. ☐ Merger bid or reorganisation in progress.
 5. ☐ Not comparable.
 6. ☐ Same interim: reduced final and/or reduced ear-
 7. ☐ Indicated.
 8. ☐ Based on 1973 profits.
 9. ☐ Not allows for conversion of shares not now rankin-

over does not allow for shares which

including a final dividend declaration.

previous total, a Rights issue pending.
Preliminary figures. * Australian cur

field exclude a special payment. ¹ Indexed dividend relates to previous dividend. P/E ratio based on current earnings. ² Forecast dividend: cover based on last year's earnings. ³ Tax free up to 30% of dividend. ⁴ Field allows for currency clause. ⁵ Dividend and yield on merger terms. ⁶ Dividend and yield include special payment: Cover does not apply to special payment. ⁷ Dividend and yield. ⁸ Preference dividend passed. ⁹ Canadian. ¹⁰ E issue price. ¹¹ G Asset reduced. ¹² Yield after sending strip and/or rights.

dividend and yield based on prospectus
sales for 1976-77. E Figures based

official estimates for 1976-77. M Figures based on prospectus or other official estimates for 1976. N Dividend based on prospectus or other official estimates for 1976. Q Gross. T Figures assumed. U No significant change. V Corporation Tax payable. Z Dividend total to date.

Abbreviations: M ex dividend; N ex scrip issue; P ex capital distribution; Q ex capital distribution; R ex capital distribution; S ex capital distribution; T ex capital distribution; U ex capital distribution; V ex capital distribution; W ex capital distribution; X ex capital distribution; Y ex capital distribution; Z ex capital distribution.

Recent Issues" and "Right

service is available to every Company dealing in the London Stock Exchanges throughout the United Kingdom for a fee of £325 per annum for each security.

